



## **Attachment 10**

# **Final Sound Modeling Report for the GE 6.1-158 Turbine (51 locations) that includes a receptor for the property located north of RE00031**



# Noise Model Report

7/29/2025

## *Coles Wind*

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Coles Wind, LLC

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## 1.0 Introduction

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Coles Wind, LLC (Applicant) is constructing a 311.1 MW wind power project in Coles County, Illinois (Project) in an area just south of the Douglas County line, west of Rardin, and on the east and west sides of Illinois Route 130 (N County Road 1600E). Paxwood Acoustics was retained by the Applicant to conduct sound propagation modeling for the Project which, as discussed in Section 2.0, is an update to the noise assessment provided with the Project's Special Use Permit Application.

Based on the information provided in this report, the Project is expected to produce sound levels that are below the Illinois Pollution Control Board noise limits meeting the noise requirements of the Coles County Amended Ordinance.

This report includes:

- A description of the Project,
- A discussion of noise standards,
- Sound propagation modeling procedure and results, and
- Conclusions

In addition, an introduction to acoustics is provided in Appendix A, supporting information is provided in Appendices B through D, and information about Paxwood Acoustics is provided in Appendix E.

## 2.0 Project Updates & Description

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A sound report was previously completed by RSG, Inc. in January 2025 (January Report<sup>1</sup>) that was included in the Coles Wind, LLC Special Use Permit Application for the Project. Coles County approved the Special Use Permit for the Project on July 1, 2025. The January Report included sound modeling for 62 turbine locations and two turbine models. Paxwood Acoustics is providing this updated and simplified noise model report (July Report) that reflects the 51 turbine locations that will be built with the GE 158 turbine model. Since the January Report, the Project has dropped 11 turbine locations from consideration, identified the 51 turbine locations to be constructed, and there have been two minor shifts to turbines (Turbines 39a and 47a both shifted 59 and 65 feet respectively). Additionally, in compliance with Condition 8 of the approved Special Use Permit, this July Report also includes sound modeling for the receptor north of RE00031; that receptor is a church and identified as CB00197 in this July Report.

This report includes the results of the sound modeling for the 51 turbine locations to be constructed using the GE 6.1-158 turbine model (GE 158) and the two transformers to be located at the Project substation. Based on this modeling, the Project is sited in compliance with the Coles County Amended Ordinance<sup>2</sup> (Ordinance).

A map of the Project showing the 51 turbine locations, the Project substation, and the surrounding area is provided in Figure 1.

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<sup>1</sup> RSG, Inc., *Coles Wind Sound Modeling*, Apex Clean Energy, 3 January 2025.

<sup>2</sup> Coles County Amended Ordinance: Standards for Wind Energy Conversion Systems over 500 kW, 9 May 2023.

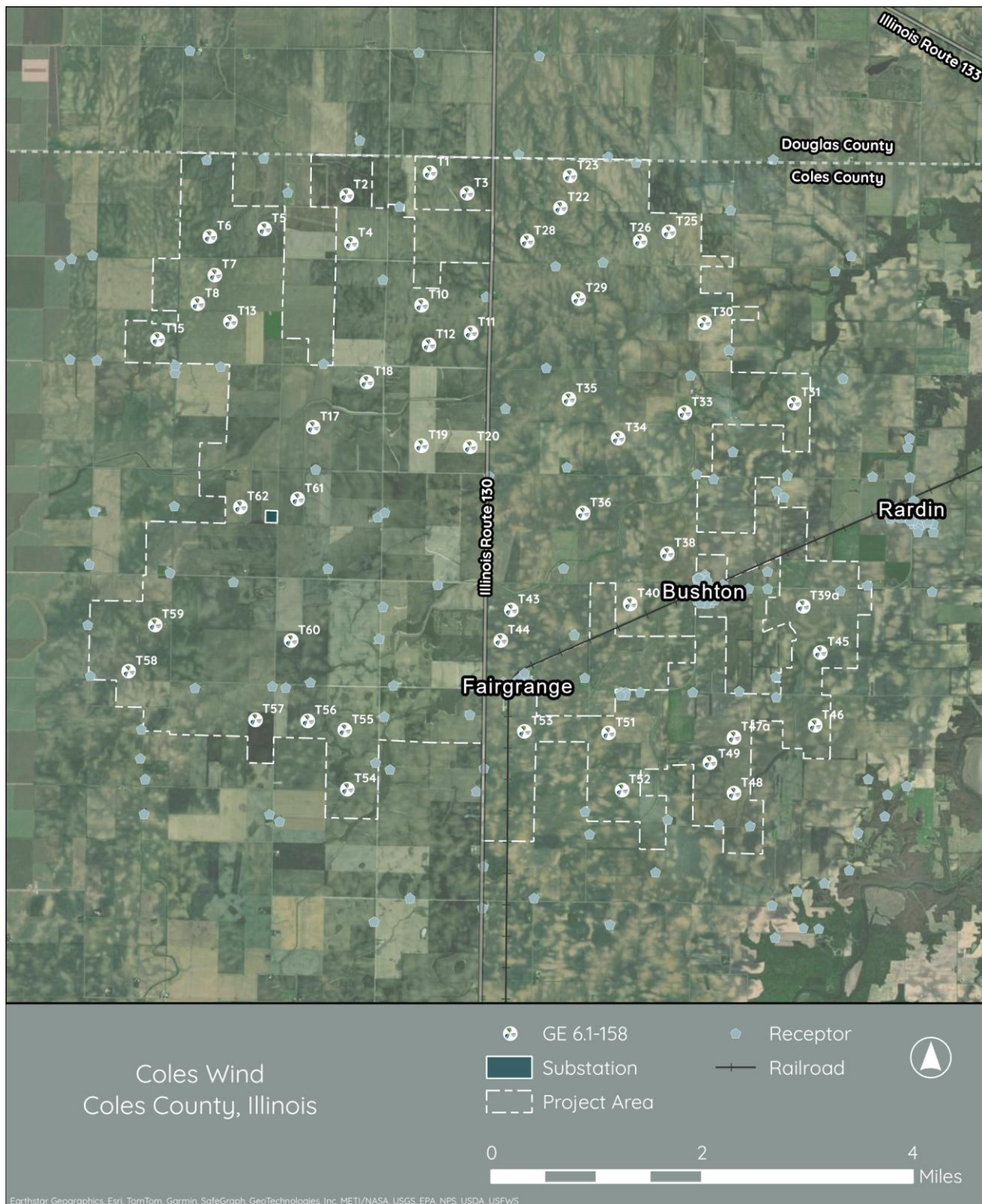


Figure 1: Map of the Project and Surrounding Area

### 3.0 Noise Standard

The Coles County Amended Ordinance<sup>2</sup> requires that the Project comply with the applicable Illinois Pollution Control Board (IPCB) regulations including the IPCB noise limits. The Ordinance also requires that Coles Wind demonstrate compliance through the use of a qualified professional. Paxwood Acoustics is well qualified to conduct this work with Principal Consultant, Eddie Duncan, who is Board Certified through the Institute of Noise Control Engineering, having conducted noise analyses on over 120 wind power projects. Additional information on Paxwood Acoustics is provided in Appendix E.

The relevant IPCB noise regulations are contained in Parts 900, 901, and 910 of Title 35, Subtitle H of the Illinois Administrative Code. Sound level limits that are applicable to the Project are defined in Section 901.102. The limits are specified by the emitting land classification to the receiving land classification, by daytime and nighttime periods, and by octave band center frequency. The Project equipment that emits sound is described in the regulation as property-line noise sources. For this Project, the property-line noise sources would be located on Class C land as defined in Appendix A of Part 901, and nearby residential land use is defined as Class A. Given this, the Class C to Class A limits are provided here in Table 1.

*Table 1: IPCB Sound Level Limits ( $L_{eq}$ ) for Class C to Class A Lands*

| <b>Octave<br/>Band Center<br/>Frequency</b> | <b>Daytime<br/>Limit (dB)</b> | <b>Nighttime<br/>Limit (dB)</b> |
|---------------------------------------------|-------------------------------|---------------------------------|
| 31.5 Hz                                     | 75                            | 69                              |
| 63 Hz                                       | 74                            | 67                              |
| 125 Hz                                      | 69                            | 62                              |
| 250 Hz                                      | 64                            | 54                              |
| 500 Hz                                      | 58                            | 47                              |
| 1 kHz                                       | 52                            | 41                              |
| 2 kHz                                       | 47                            | 36                              |
| 4 kHz                                       | 43                            | 32                              |
| 8 kHz                                       | 40                            | 32                              |

The limits in Table 1 are based on the equivalent continuous sound pressure level or  $L_{eq}$  as defined in Part 900.

In addition to the specific limits by octave band frequency, Section 901.106 of the regulations prohibit prominent discrete tones. A prominent discrete tone is defined by the following conditions:

- A 1/3 octave band with a center frequency between 500 Hz and 10 kHz that exceeds the arithmetic average of the sound pressure levels of the two adjacent 1/3 octave bands by 5 dB.
- A 1/3 octave band with a center frequency between 160 Hz and 400 Hz that exceeds the arithmetic average of the sound pressure levels of the two adjacent 1/3 octave bands by 8 dB.
- A 1/3 octave band with a center frequency between 25 Hz and 125 Hz that exceeds the arithmetic average of the sound pressure levels of the two adjacent 1/3 octave bands by 15 dB.

However, the regulation provides that the prohibition of prominent discrete tones does not apply if the one-third octave band sound pressure level is 10 dB or more below the corresponding octave band sound pressure level limits from Table 1.

Lastly, sound from construction of the Project is exempt from these limits per Section 901.107(d) of the regulations.

## 4.0 Sound Propagation Modeling

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### 4.1 Modeling Procedure & Settings

Sound propagation modeling was completed using the modeling software CadnaA made by DataKustik GmbH. CadnaA implements the international sound propagation standard, ISO 9613-2 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.” Both CadnaA and the ISO 9613-2 standard are used by noise control professionals across the United States and are regularly relied upon by local and state jurisdictions. The model takes into account source sound emissions, topography, receptor locations, and several other factors. It calculates sound levels for meteorological conditions that are favorable for sound propagation, assuming that all receptors are downwind of the sound sources.

Like the modeling in the January Report, the modeling conducted for this report followed the ANSI/ACP wind turbine sound modeling standard<sup>3</sup> including a +2 dB factor added to the turbine sound power level and using a ground factor of  $G=0.5$ .

For this assessment, USGS terrain data was used for the Project to create the three-dimensional topography throughout the surrounding area. Other site features, including the proposed locations of equipment and nearby receptors, were provided by the Applicant.

Model input data and parameters are provided in Appendix B.

The model was used to calculate sound levels ( $L_{eq}$ ) throughout the area at a grid of receptors that were spaced every 50 feet (15.24 meters). Each receptor was modeled at 13 feet (4 meters) above ground level. Based on the grid of receptors, sound level iso-lines are generated throughout the area so that the projected sound levels can be shown throughout the surrounding area including residential land uses. In addition to the grid of receptors used to generate sound level iso-lines, discrete receptors were modeled at 196 residences<sup>4</sup> and one church (CB00197) near the Project.

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<sup>3</sup> ANSI/ACP Standard 111-1, *Wind Turbine Sound Modeling*, American National Standards Institute, 2022.

<sup>4</sup> The IPCB limits apply not only to the residential structures, but also to the surrounding residential land use. As such the surrounding residential land use for each receptor that approached the IPCB limits was checked to ensure that sound levels are below the IPCB limits. Detailed model results for receptors with the highest model results (within 1 dB of the IPCB limit) in the 1 kHz octave band are provided in Appendix C, showing that the limit is met throughout the residential area surrounding the receptor.

## 4.2 Modeled Sound Sources

The model included sound emissions from 51 wind turbines (GE 158) and two high voltage transformers at the Project substation, one 175 MVA/1300 kV BIL and one 222 MVA/1050 kV BIL. The specified sound levels for the transformers was provided by the Applicant. The 175 MVA transformer is listed as 86 dBA with cooling fans operating (ONAF<sup>5</sup>) and 83 dBA with the cooling fans no operating (ONAN<sup>6</sup>). The 222 MVA transformer is listed as 87 dBA ONAF. These are the sound levels that would be measured within one to six feet of the transformer per IEC 60076-10<sup>7</sup>. The sound power level for the ONAF setting for each transformer was calculated and used in the sound propagation model. The modeled sound power levels for the transformers is provided in Appendix B.

For wind turbine sound emissions, the manufacturer sound power levels by 1/3 octave band were used in the sound propagation model. Of the 51 turbines, nine were modeled as using noise reduced operations (NRO), specifically NRO 102, to meet the nighttime IPCB Class C to Class A limit.

## 4.3 Model Results

Model results for each octave band center frequency are presented in map format in Appendix C and tabular format for each discrete receptor in Appendix D. The highest projected sound level for each octave band at all receptors is presented in Table 2 with a comparison to the IPCB Class C to Class A nighttime limits. The closest the model results come to the nighttime IPCB limits is in the 1 kHz octave band with a projected sound level of 40 dBZ and an IPCB limit of 41 dBZ.

*Table 2: Highest Model Results by Octave Band*

|                                                       | Full Octave Band Center Frequency |       |        |        |        |      |       |       |       |
|-------------------------------------------------------|-----------------------------------|-------|--------|--------|--------|------|-------|-------|-------|
|                                                       | 31.5 Hz                           | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1kHz | 2 kHz | 4 kHz | 8 kHz |
| <b>Highest Model Result (dBZ)</b>                     | 62                                | 58    | 50     | 47     | 45     | 40   | 33    | 13    | <1    |
| <b>IPCB Class C to Class A Nighttime Limits (dBZ)</b> | 69                                | 67    | 62     | 54     | 47     | 41   | 36    | 32    | 32    |

<sup>5</sup> Oil Natural, Air Forced

<sup>6</sup> Oil Natural, Air Natural

<sup>7</sup> IEC 60076-10, Power Transformers – Part 10: Determination of Sound Levels

## 4.4 Tonality

As indicated in the January Report, sound emissions from the GE 158 do not meet the IPCB-specified criteria to be considered tonal.

High voltage transformers like those to be located at the Project substation can be tonal at 120 Hz and potentially at the harmonic of 240 Hz. For this Project however, the projected full octave band sound levels at 125 Hz and 250 Hz at the nearest receptors from the substation transformers are at least 10 dB below the IPCB octave band limits, as shown in Table 3. Given this, the prominent discrete tone clause of the IPCB regulations does not apply.

*Table 3: Projected Sound Levels (dBZ) at 125 Hz and 250 Hz of Transformer Sound at Receptors Closest to the Substation*

| Receptor                                              | Sound Pressure Level (dBZ) by Full Octave Band Center Frequency |        |
|-------------------------------------------------------|-----------------------------------------------------------------|--------|
|                                                       | 125 Hz                                                          | 250 Hz |
| RE00041                                               | 39                                                              | 39     |
| RE00084                                               | 37                                                              | 37     |
| RE00104                                               | 37                                                              | 37     |
| <b>IPCB Class C to Class A Nighttime Limits (dBZ)</b> | 62                                                              | 54     |

## 5.0 Conclusions

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Paxwood Acoustics conducted sound propagation modeling for Coles Wind which is an update to the modeling that was provided in the January Report<sup>1</sup>. The model updates included:

- The 51 turbines planned for construction using the GE 6.1-158 turbine model,
- Minor shifts to Turbines 39a and 47a as discussed in Section 2.0,
- Inclusion of Receptor CB00197, a church that is just north of RE00031,
- An update to the transformer rating of one of the high voltage transformers at the Project substation, and
- Reduction of the use of NRO to nine turbines instead of seventeen that were modeled in the January Report, due to the reduction in the number of turbines being modeled.

Like the overall conclusions of the January Report, this update finds that the projected sound levels from the Project will be below the nighttime IPCB Class C to Class A sound level limits for each octave band for every receptor and the residential use area around each receptor. Detailed model results are provided in Appendices C and D.

With this, the Project is expected to meet the noise requirements of the Coles County Amended Ordinance<sup>2</sup>.

# Appendix A: Introduction to Acoustics

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## Sound, Sources, and Perception

Sound in air is caused by fluctuations in air pressure which can be due to a variety of sources. The sources of sound can generally be grouped into three major categories: anthropogenic, biogenic, and geophonic. Anthropogenic sounds are human caused sounds such as voices, instruments, vehicles, and mechanical and electrical equipment. Biogenic sounds are those that are caused by organisms such as animal calls or animal interaction with the environment. And lastly geophonic sounds are those caused by the environment itself such as waves hitting a shoreline or wind interacting with plants or other objects.

There are three primary characteristics of sound that affect human perception: frequency which may also be referred to as pitch or tone, amplitude which relates to perceived loudness or volume, and temporal fluctuations, which is to say that sound can change with time.

### *Frequency*

Humans can hear sound over a range of frequencies typically from 20 Hz to 20,000 Hz. While not strictly defined, this range can be divided into three subranges which are described as low frequency (20 Hz to around 250 Hz), mid frequency (around 250 Hz to around 4,000 Hz), and high frequency (around 4,000 Hz to 20,000 Hz). The mid frequency range is where most human speech occurs. More defined ranges of frequency are divided into octave bands (31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz), or even further into 1/3 octave bands which are three smaller bands within each octave band. Sound below 20 Hz is referred to infrasound and is not typically audible to the human ear. Sound above 20,000 Hz is referred to as ultrasound and is also not audible to the human ear.

Most sounds are broadband in nature and contain energy at a range of frequencies. If however, a sound contains notably more energy at a specific frequency compared to the adjacent frequencies, then the sound can be perceived as a tone, such as a note in music.

### *Amplitude*

Humans can hear sound over a wide range of pressures, from approximately 20 micropascals to over 20 million micropascals. Sound can occur outside of this range, but below 20 micropascals is typically inaudible to humans and above 20 million micropascal can cause pain. In acoustics, this wide range of audible sound pressures is compressed using a logarithmic scale to create a range of sound pressure levels from 0 dB (20

micropascals) to 120 dB (20 million micropascals). It is in this logarithmic scale, denoted as decibel or dB, that acousticians and environmental regulations quantify the amplitude of sound.

### ***Temporal Changes***

Both frequency and amplitude can change with time. A sound may be constant in both frequency and level, but this is fairly uncommon. If one considers the fluctuation in sounds from people having conversations, birds chirping, or vehicles passing by, it becomes apparent how much sound can change from one instance to the next. It is for this reason that acousticians use a variety of metrics to define and describe sound. These metrics are discussed further below.

## **Weighting Networks, Sound Pressure Level, and Metrics**

### ***Weighting Networks***

Humans are most sensitive to sound between 500 Hz and 5 kHz. Our sensitivity with sound decreases below 500 Hz and above 5 kHz. In order to account for this varying sensitivity, the A-weighting network or filter was developed to mimic the sensitivity of the human ear and how we perceive loudness. A-weighting discounts sound in varying degrees by frequency below 500 Hz and above 5,000 Hz. Between 1,000 Hz and 4,000 Hz, the A-weighting network amplifies sound slightly to account for the increased sensitivity of the human ear in that range. Since the A-weighting network accounts for human sensitivity at difference frequencies, it is widely used in environmental acoustics and most environmental regulations. When a sound level is A-weighted, an “A” is typically added to the end of the abbreviation for decibel: dBA.

There are other weighting networks with different purposes, such as C, G, or Z, but A-weighting is most used in environmental acoustics. If a sound is not weighted or sometimes referred to as unweighted, it is considered Z-weighted or dBZ.

### ***Sound Pressure Level***

As was discussed previously, in acoustics, the amplitude of sound is often referred to in terms of sound pressure level. Representative sound pressure levels of some common sound sources and environments are shown in Figure 2. The sound levels presented in Figure 2 are meant to be illustrative, so any specific source or environment may be similar to or fall outside of the ranges shown in the graphic.

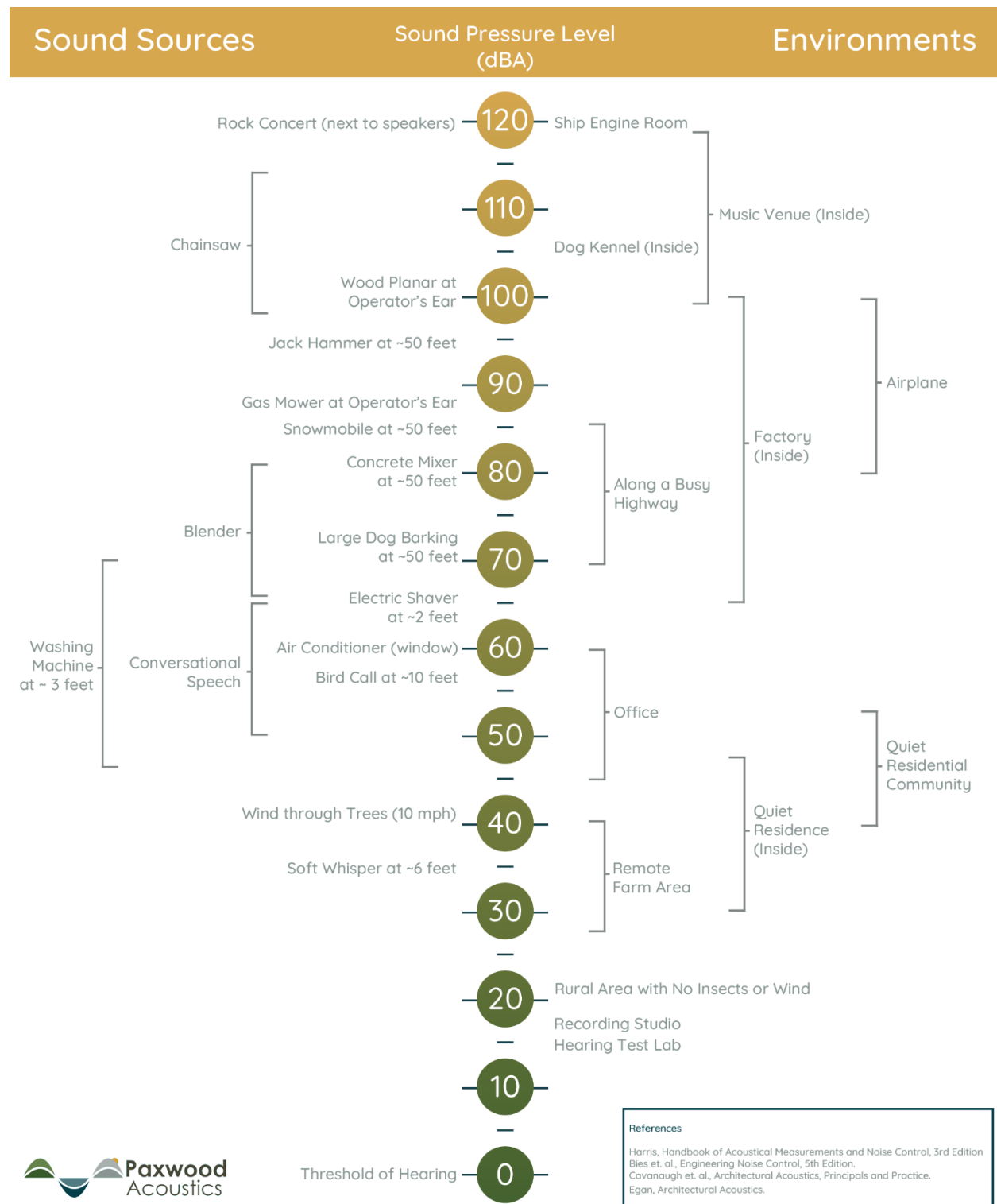


Figure 2: Representative Sound Pressure Levels (dBA) of Common Sound Sources & Environments

Since sound is a logarithmic function, one cannot use regular arithmetic operations to add and subtract sound levels. So, for example, conversational speech typically occurs at a level between 55 dBA and 65 dBA. If one person is speaking at a level of 60 dBA and another person is also speaking at a level of 60 dBA, the total sound level is not 120 dBA. (And a good thing too, otherwise, two people talking at the same time would quickly approach the threshold of pain, 120 dBA.) Instead, two voices at the same level only causes an increase of 3 dB, so 60 dBA plus 60 dBA equals 63 dBA.

In terms of perception of sound level there are two helpful rules of thumb to be aware of:

- 1) A change in broadband sound level of 10 dB is perceived as a halving or doubling of loudness, depending on if the amplitude of the sound decreased or increased, and 2) Changes in sound level of less than 3 dB are generally considered not perceptible.

### ***Sound Level Metrics***

With sound levels in an environment continuously changing, different sound level metrics are used to describe the sound level versus time. Some common sound level metrics are briefly described below:

- **Equivalent Continuous Sound Level ( $L_{eq}$ ):** The  $L_{eq}$  is the level of the average sound pressure over a specified period of time. It takes into account quieter, long-term sound levels along with louder, short-duration sound levels to provide an overall sound level for a given time period. The louder sound levels, even with a short-duration, can have a strong influence on the  $L_{eq}$ . The  $L_{eq}$  is often used in environmental acoustics to convey an average representation of the acoustical environment, even though it is influenced more strongly by higher sound levels that occur over the specified interval. An  $L_{eq}$  may be as short as 1-second or up to an hour or more depending on the purpose of the quantification.
- **Statistical Sound Levels ( $L_n$ ):** Statistical sound levels or percentile sound levels describe the level that is exceeded for a specified percentage of time. The  $L_{10}$ , for example, is the level that is exceeded 10% of the time. The  $L_{50}$ , is the median sound level: half the time the sound level is above the  $L_{50}$  and half the time the sound level is below the  $L_{50}$ . And the  $L_{90}$  is the sound level that is exceeded 90% of the time.
- **Maximum Sound Level ( $L_{max}$ ):** The phrase “maximum sound level” may be used to describe the maximum  $L_{eq}$  or  $L_n$  over a given time period, but it can also be used to describe the sound level over a very short-duration typically using either a 1-second time constant which is referred to as slow-response, or a 125-millisecond time constant which is referred to as a fast-response. If the  $L_{max}$  metric is being used, it is good practice to note which time constant is being applied by adding the

notation S or F to the abbreviation:  $L_{Smax}$  or  $L_{Fmax}$ . The most appropriate time constant to use depends on the specific context of the quantification.

- Day-Night Level ( $L_{dn}$ ): The  $L_{dn}$  is similar to the  $L_{eq}$  except that it is specifically applied over an entire day or 24-hour period with a 10 dB penalty applied to sound levels between 10 PM and 7 AM to account for greater sensitivity at night.

## Appendix B: Model Settings & Input

Table 4: Sound Propagation Model Settings

| Model Parameter         | Setting                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Ground Attenuation      | ISO 9613-2 spectral ground attenuation with a ground factor of 0.5 in accordance with ANSI/ACP Standard 111-1. <sup>3</sup> |
| Topography              | USGS terrain.                                                                                                               |
| Foliage Attenuation     | No attenuation due to forest was taken into account in the model.                                                           |
| Atmospheric Attenuation | Based on 70% relative humidity and 10° C.                                                                                   |
| Search Radius           | 5 miles (8,000 meters).                                                                                                     |
| Receptor Grid           | 50 feet by 50 feet (15 meters by 15 meters) throughout the Project and surrounding area at a height of 13 feet (4 meters).  |

Table 5: Modeled Point Source

| Source        | Equipment           | Relative Height (m) | Coordinates (NAD83 Z16N) |         | Elevation (m) |
|---------------|---------------------|---------------------|--------------------------|---------|---------------|
|               |                     |                     | X (m)                    | Y (m)   |               |
| Transformer 1 | 175 MVA Transformer | 3.9                 | 395653                   | 4384285 | 209           |
| Transformer 2 | 222 MVA Transformer | 3.6                 | 395653                   | 4384315 | 209           |
| T1            | GE 6.1-158          | 117                 | 398075                   | 4389586 | 323           |
| T2            | GE 6.1-158          | 117                 | 396799                   | 4389240 | 324           |
| T3            | GE 6.1-158          | 117                 | 398641                   | 4389266 | 325           |
| T4            | GE 6.1-158          | 117                 | 396869                   | 4388505 | 326           |
| T5            | GE 6.1-158          | 117                 | 395549                   | 4388723 | 325           |
| T6            | GE 6.1-158          | 117                 | 394712                   | 4388608 | 326           |
| T7            | GE 6.1-158          | 117                 | 394790                   | 4388019 | 327           |
| T8            | GE 6.1-158          | 117                 | 394528                   | 4387578 | 328           |
| T10           | GE 6.1-158          | 117                 | 397947                   | 4387557 | 330           |
| T11           | GE 6.1-158          | 117                 | 398700                   | 4387138 | 328           |
| T12           | GE 6.1-158          | 117                 | 398058                   | 4386951 | 328           |
| T13           | GE 6.1-158          | 117                 | 395024                   | 4387306 | 328           |
| T15           | GE 6.1-158          | 117                 | 393915                   | 4387041 | 326           |
| T17           | GE 6.1-158          | 117                 | 396287                   | 4385695 | 320           |
| T18           | GE 6.1-158          | 117                 | 397107                   | 4386387 | 324           |
| T19           | GE 6.1-158          | 117                 | 397944                   | 4385415 | 324           |
| T20           | GE 6.1-158          | 117                 | 398687                   | 4385394 | 327           |
| T22           | GE 6.1-158          | 117                 | 400069                   | 4389048 | 328           |
| T23           | GE 6.1-158          | 117                 | 400215                   | 4389534 | 325           |

| Source | Equipment  | Relative Height (m) | Coordinates (NAD83 Z16N) |         | Elevation (m) |
|--------|------------|---------------------|--------------------------|---------|---------------|
|        |            |                     | X (m)                    | Y (m)   |               |
| T25    | GE 6.1-158 | 117                 | 401727                   | 4388677 | 334           |
| T26    | GE 6.1-158 | 117                 | 401288                   | 4388538 | 334           |
| T28    | GE 6.1-158 | 117                 | 399559                   | 4388537 | 330           |
| T29    | GE 6.1-158 | 117                 | 400347                   | 4387659 | 330           |
| T30    | GE 6.1-158 | 117                 | 402271                   | 4387292 | 324           |
| T31    | GE 6.1-158 | 117                 | 403641                   | 4386065 | 319           |
| T33    | GE 6.1-158 | 117                 | 401967                   | 4385916 | 320           |
| T34    | GE 6.1-158 | 117                 | 400951                   | 4385527 | 326           |
| T35    | GE 6.1-158 | 117                 | 400197                   | 4386126 | 326           |
| T36    | GE 6.1-158 | 117                 | 400415                   | 4384382 | 321           |
| T38    | GE 6.1-158 | 117                 | 401702                   | 4383765 | 320           |
| T39a   | GE 6.1-158 | 117                 | 403775                   | 4382962 | 320           |
| T40    | GE 6.1-158 | 117                 | 401137                   | 4382996 | 321           |
| T43    | GE 6.1-158 | 117                 | 399314                   | 4382904 | 322           |
| T44    | GE 6.1-158 | 117                 | 399156                   | 4382442 | 323           |
| T45    | GE 6.1-158 | 117                 | 404040                   | 4382257 | 322           |
| T46    | GE 6.1-158 | 117                 | 403959                   | 4381140 | 323           |
| T47a   | GE 6.1-158 | 117                 | 402721                   | 4380961 | 322           |
| T48    | GE 6.1-158 | 117                 | 402723                   | 4380104 | 324           |
| T49    | GE 6.1-158 | 117                 | 402352                   | 4380577 | 323           |
| T51    | GE 6.1-158 | 117                 | 400802                   | 4381024 | 325           |
| T52    | GE 6.1-158 | 117                 | 401007                   | 4380156 | 325           |
| T53    | GE 6.1-158 | 117                 | 399517                   | 4381050 | 324           |
| T54    | GE 6.1-158 | 117                 | 396811                   | 4380171 | 322           |
| T55    | GE 6.1-158 | 117                 | 396772                   | 4381070 | 324           |
| T56    | GE 6.1-158 | 117                 | 396208                   | 4381215 | 322           |
| T57    | GE 6.1-158 | 117                 | 395409                   | 4381231 | 324           |
| T58    | GE 6.1-158 | 117                 | 393472                   | 4381968 | 325           |
| T59    | GE 6.1-158 | 117                 | 393872                   | 4382679 | 327           |
| T60    | GE 6.1-158 | 117                 | 395952                   | 4382435 | 326           |
| T61    | GE 6.1-158 | 117                 | 396053                   | 4384599 | 322           |
| T62    | GE 6.1-158 | 117                 | 395175                   | 4384479 | 321           |

Table 6: Modeled Sound Power Level (dBZ) by Octave Band Frequency<sup>8</sup>

| Source                | Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Overall Sound Power Level |     |
|-----------------------|----------------------------------------|----|-----|-----|-----|------|------|------|------|---------------------------|-----|
|                       | 31.5                                   | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | dBA                       | dBZ |
| T1, ONAF<br>(175 MVA) | 100                                    | 94 | 111 | 111 | 113 | 101  | 92   | 86   | 81   | 111                       | 117 |
| T2, ONAF<br>(222 MVA) | 101                                    | 95 | 112 | 112 | 113 | 102  | 93   | 86   | 82   | 112                       | 118 |

<sup>8</sup> Spectral levels for the transformers were derived from the *Handbook of Acoustical Measurements and Noise Control, Third Edition*, Cyril M. Harris (ed.), 1998.

## Appendix C: Model Result Maps

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Appendix C contains the model results in map format for each octave band center frequency. In each map, sound levels are represented by sound level isolines in 5 dB intervals represented by solid color lines. The line that represents the IPCB limit for each octave band is represented as a yellow dashed line.

At the end of Appendix C are a zoomed-in maps for receptors with the highest model results (within 1 dB of the IPCB limit) in the 1 kHz octave band, showing that the limit is met throughout the residential area surrounding the receptor.

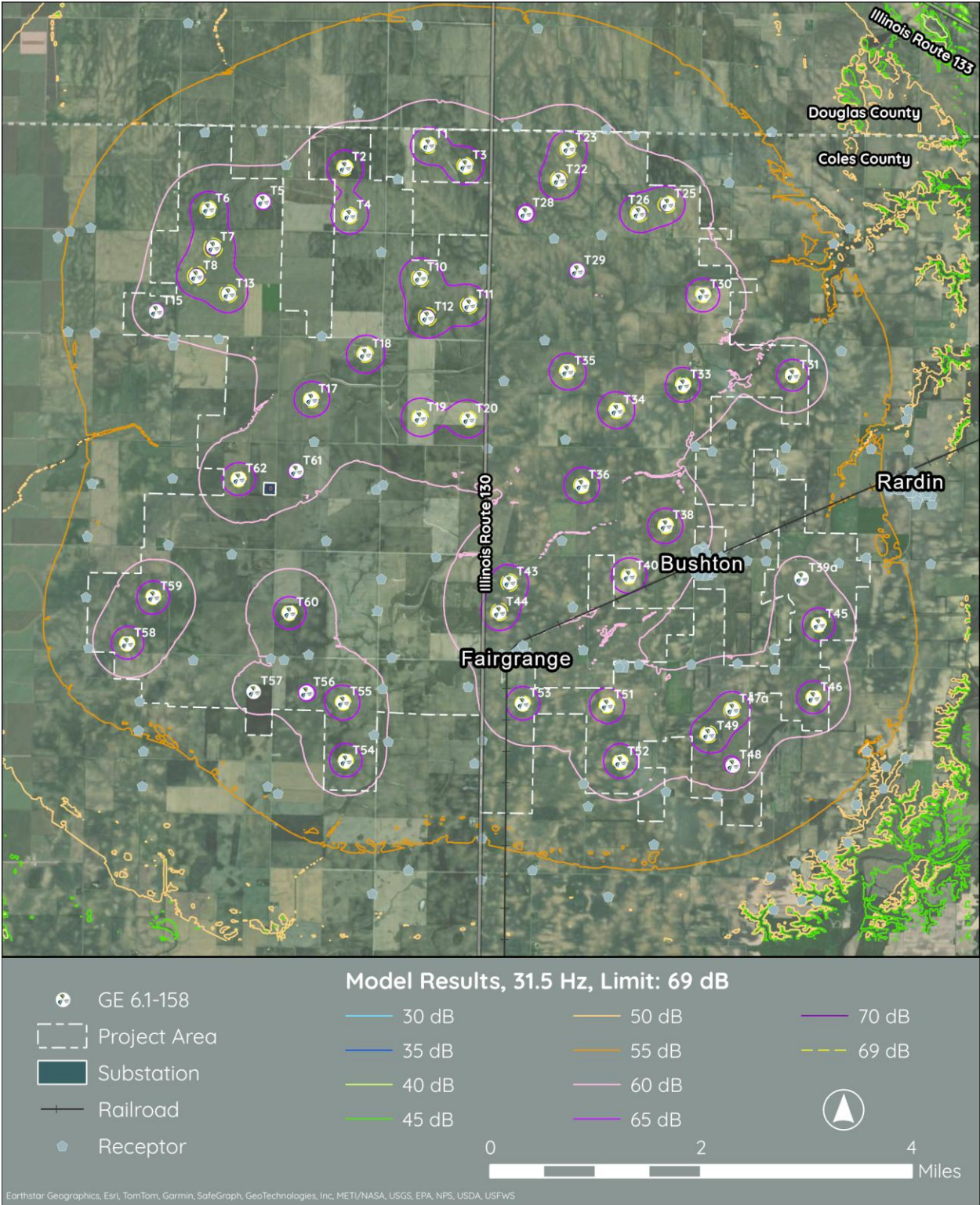


Figure 3: Model Results Map for the 31.5 Hz Octave Band

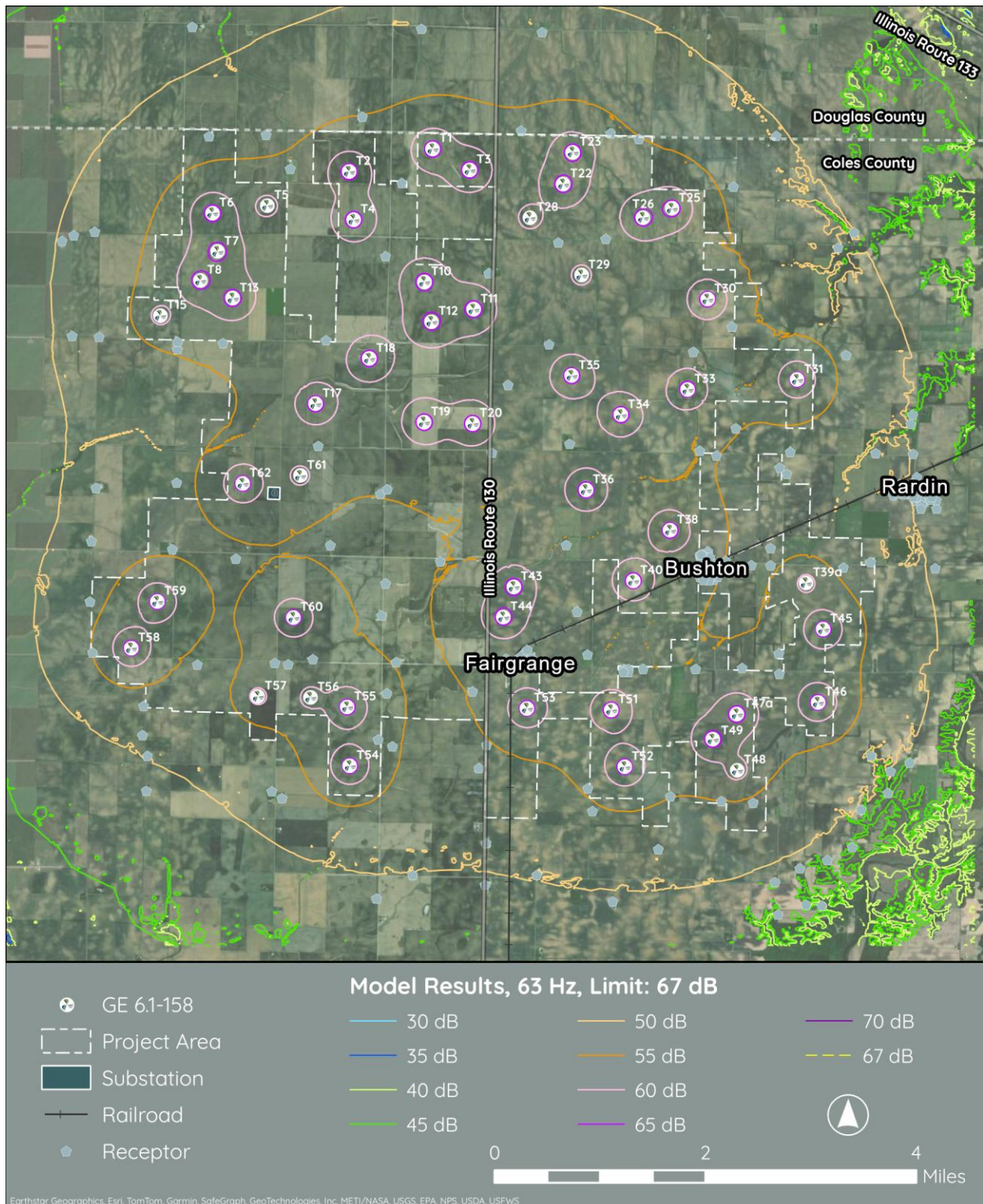


Figure 4: Model Results Map for the 63 Hz Octave Band

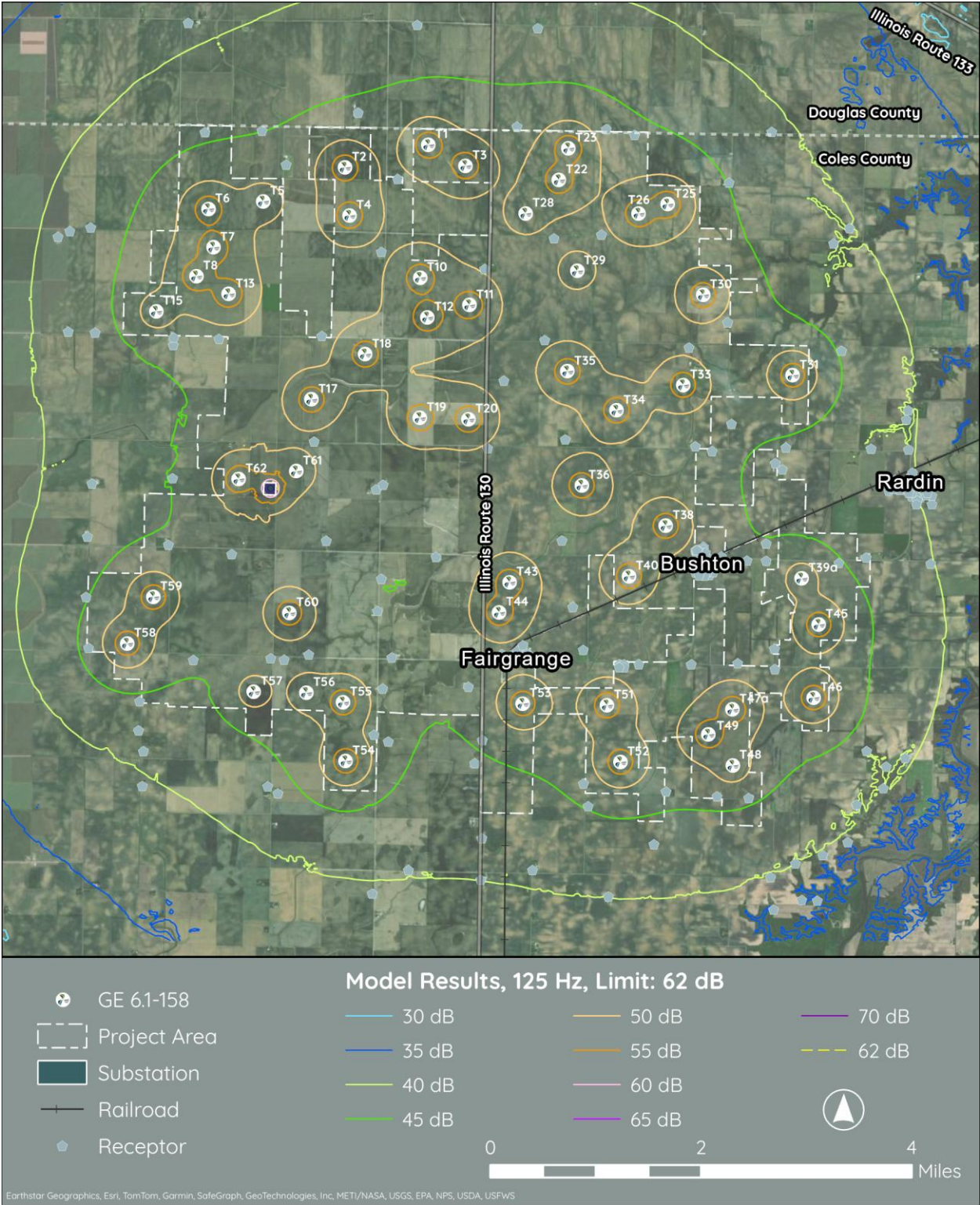


Figure 5: Model Results Map for the 125 Hz Octave Band

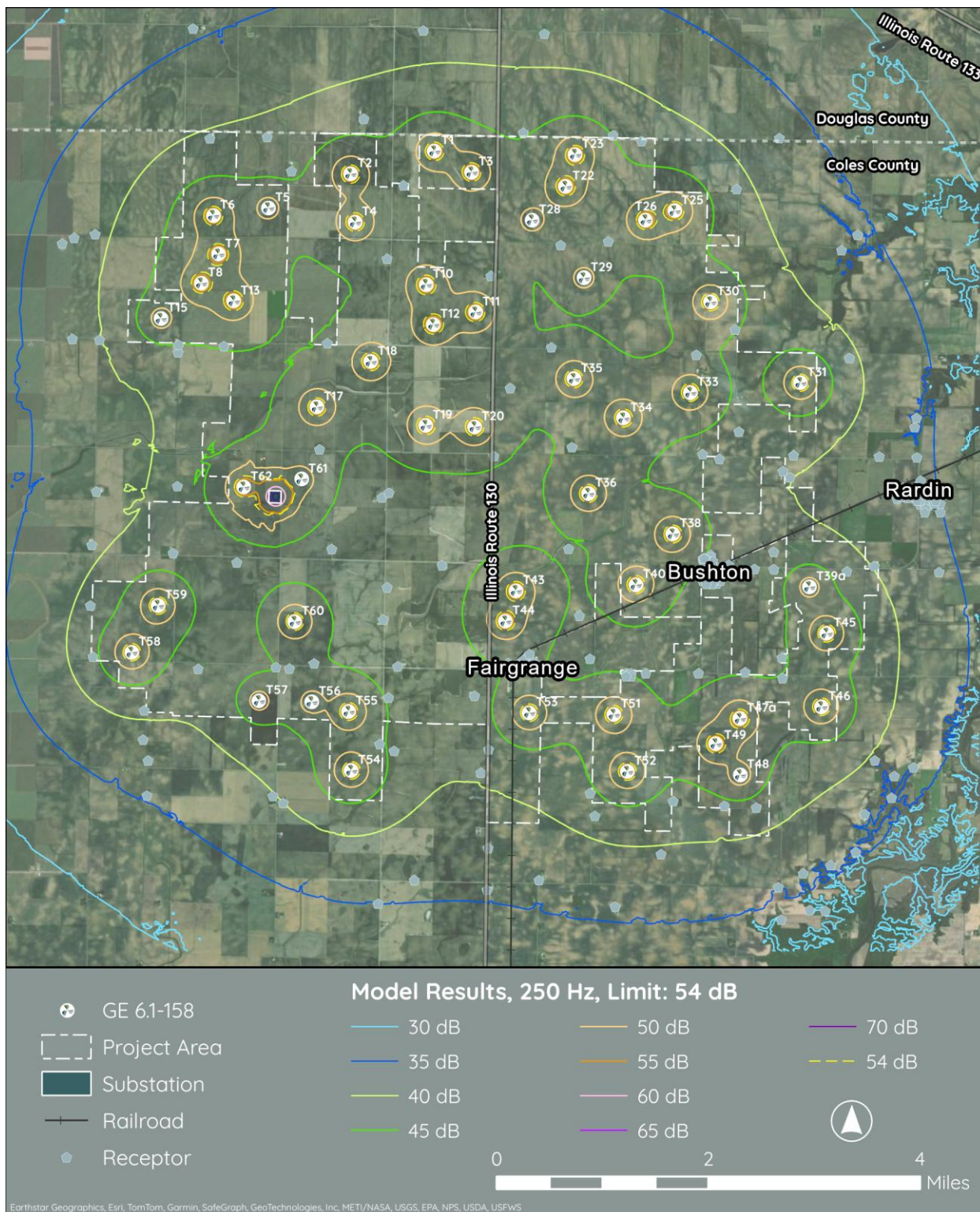


Figure 6: Model Results Map for the 250 Hz Octave Band



Figure 7: Model Results Map for the 500 Hz Octave Band

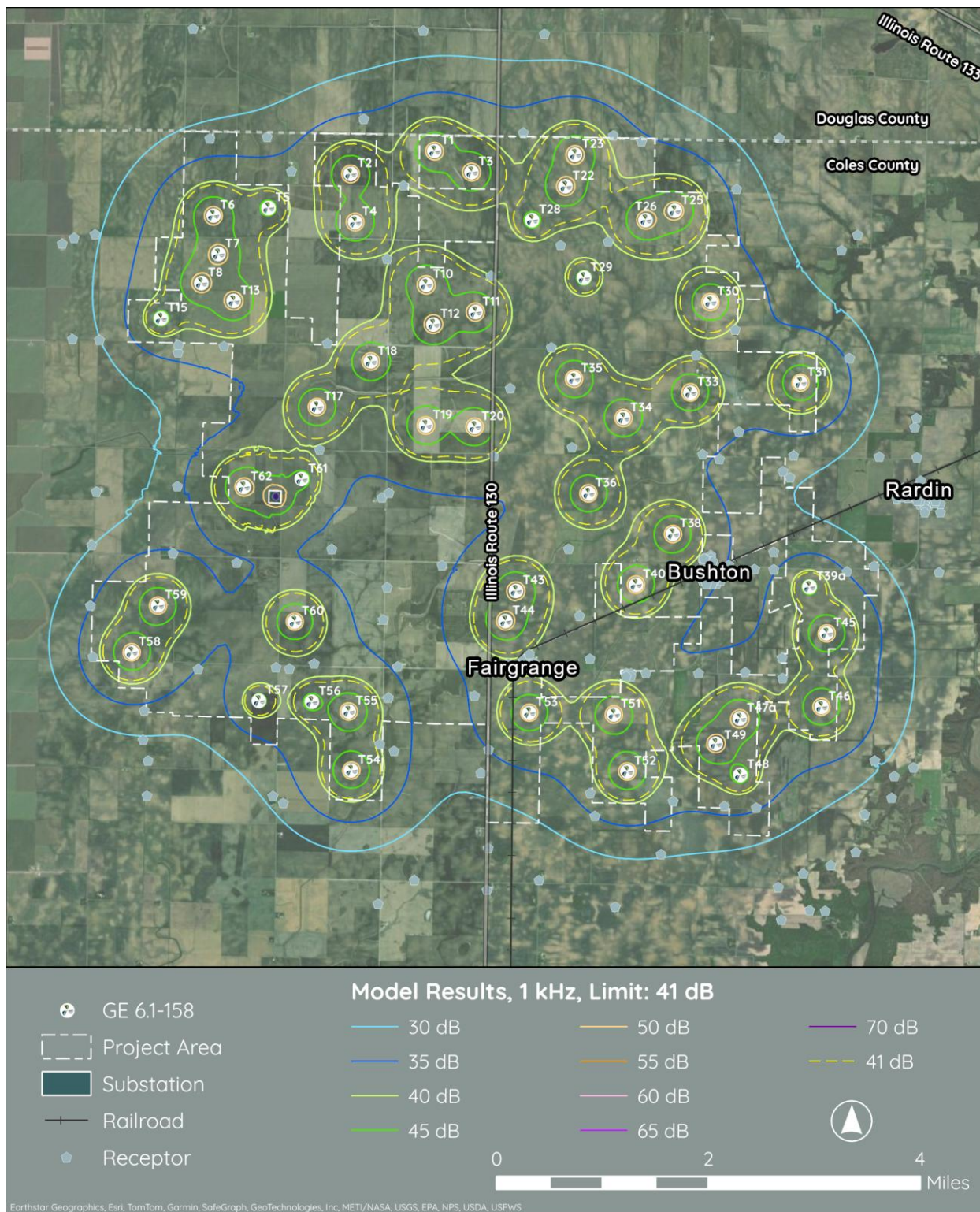


Figure 8: Model Results Map for the 1 kHz Octave Band

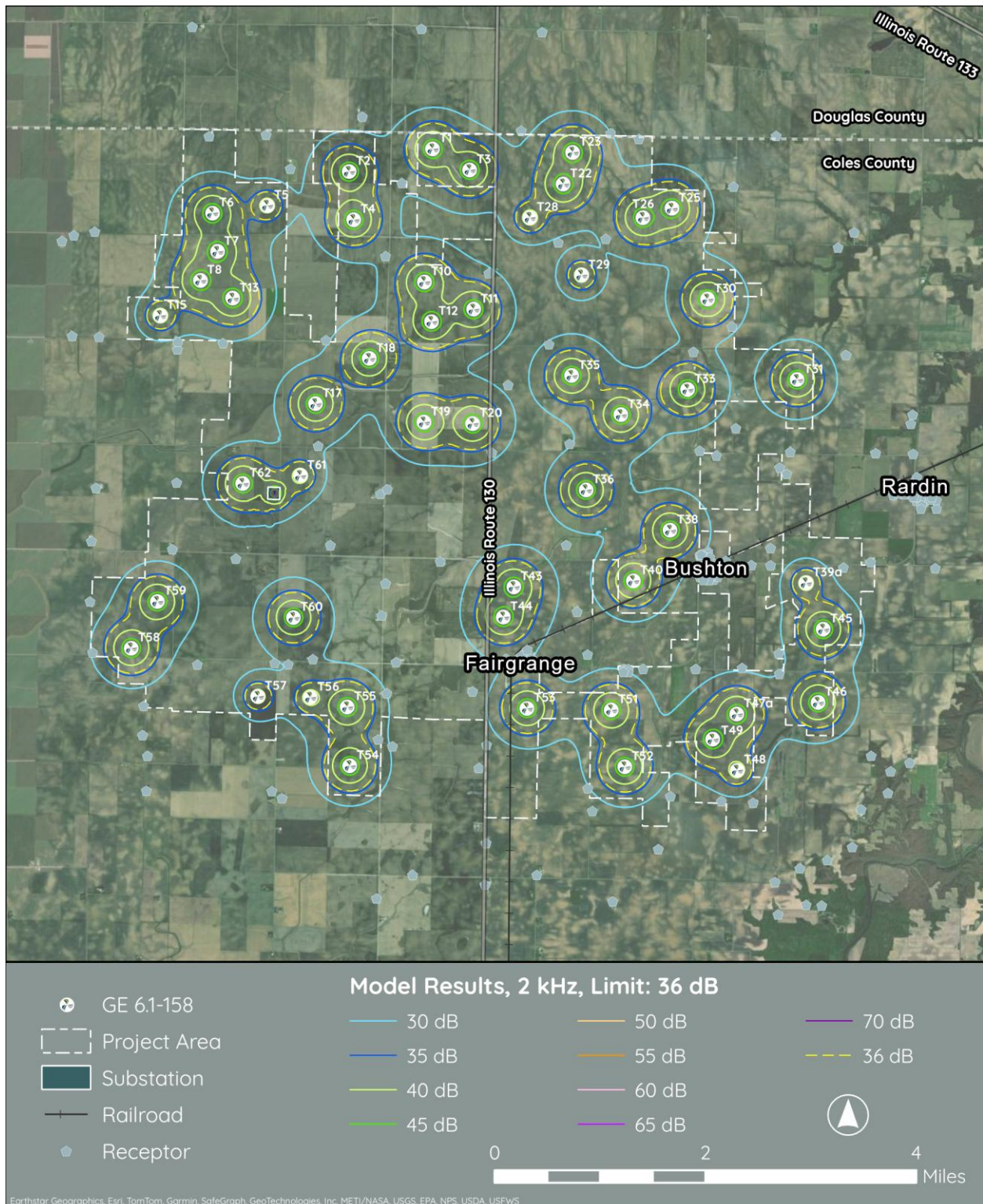


Figure 9: Model Results Map for the 2 kHz Octave Band

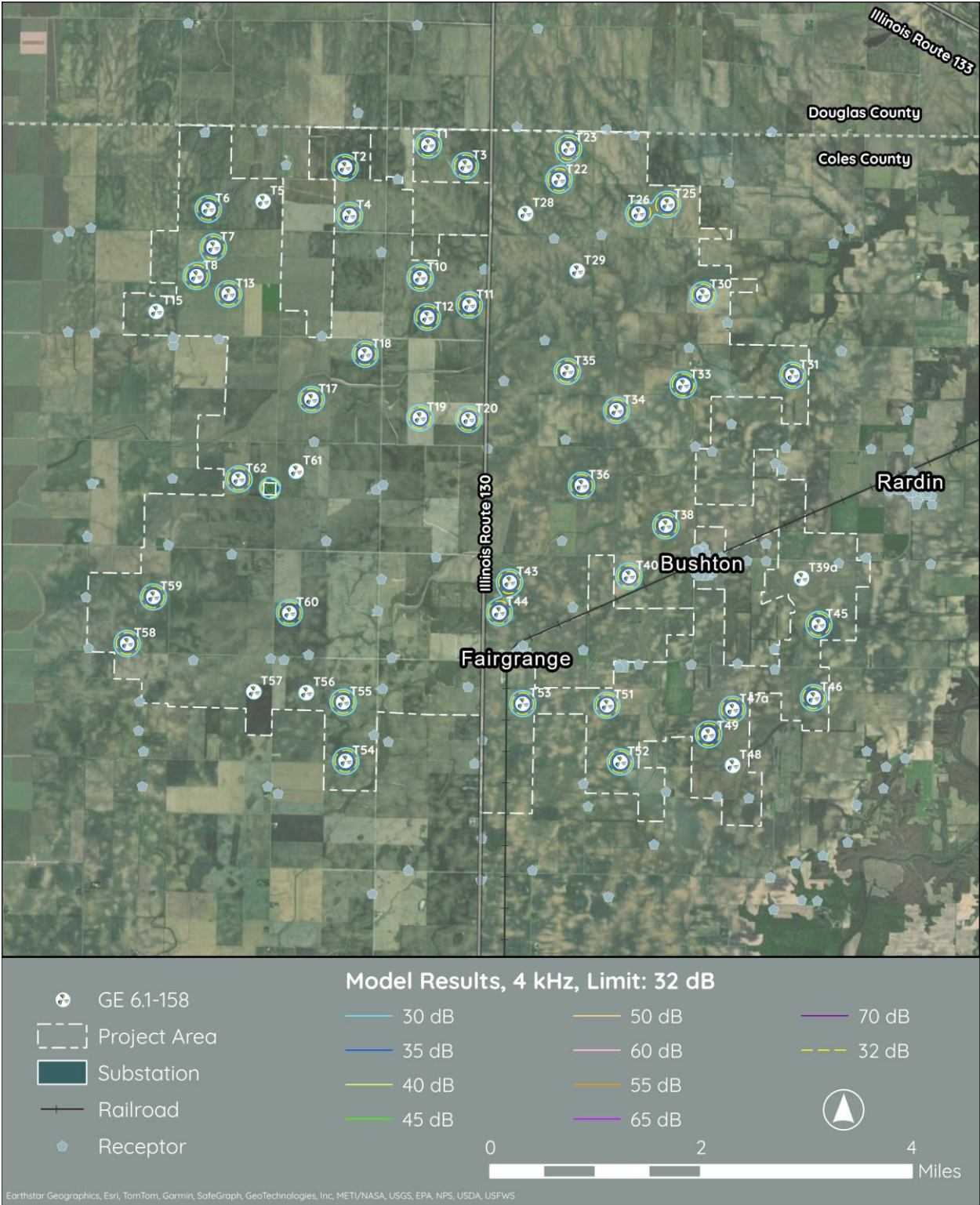


Figure 10: Model Results Map for the 4 kHz Octave Band

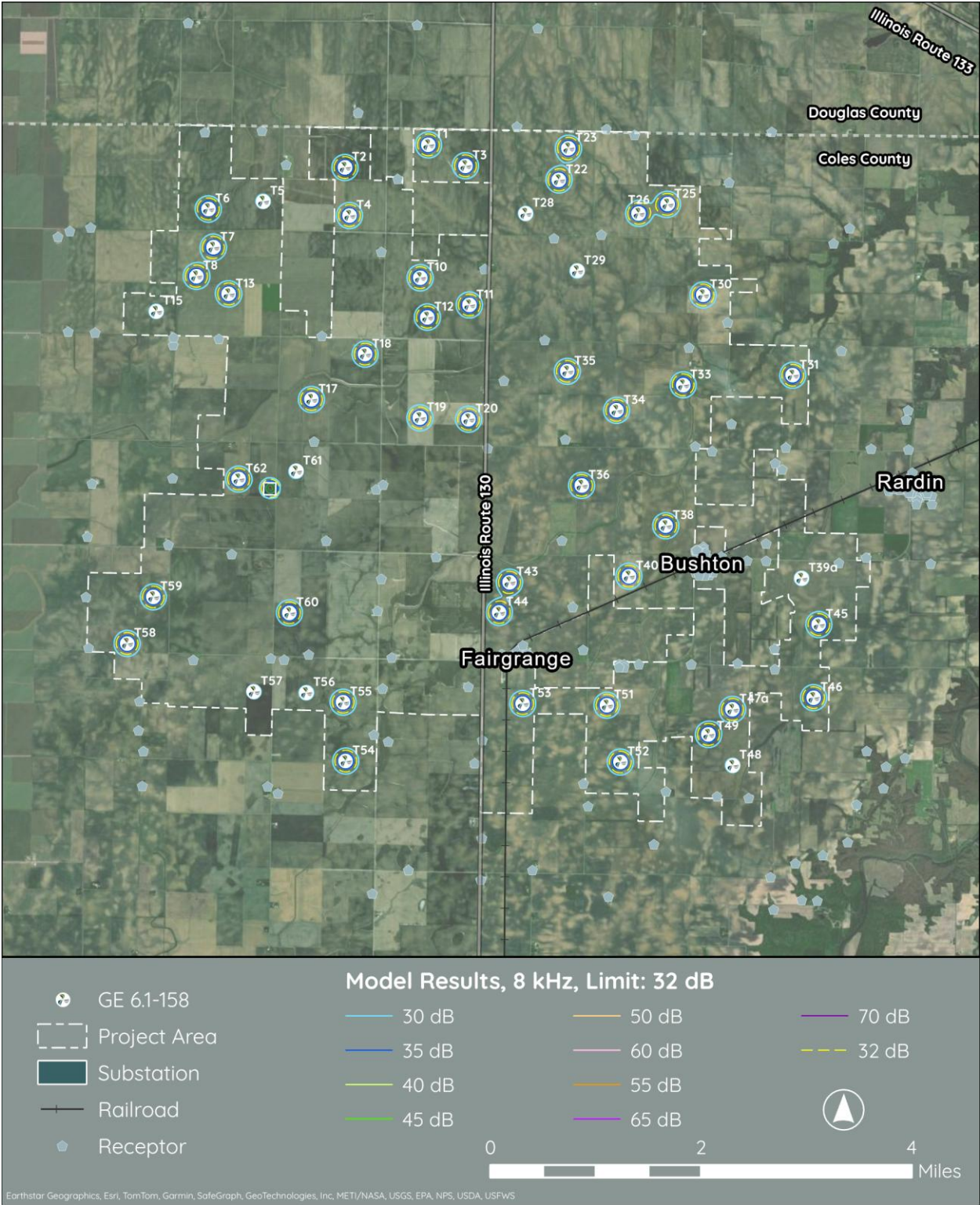


Figure 11: Model Results Map for the 8 kHz Octave Band



Figure 12: Detailed Model Results Map for the 1 kHz Octave Band, RE00013

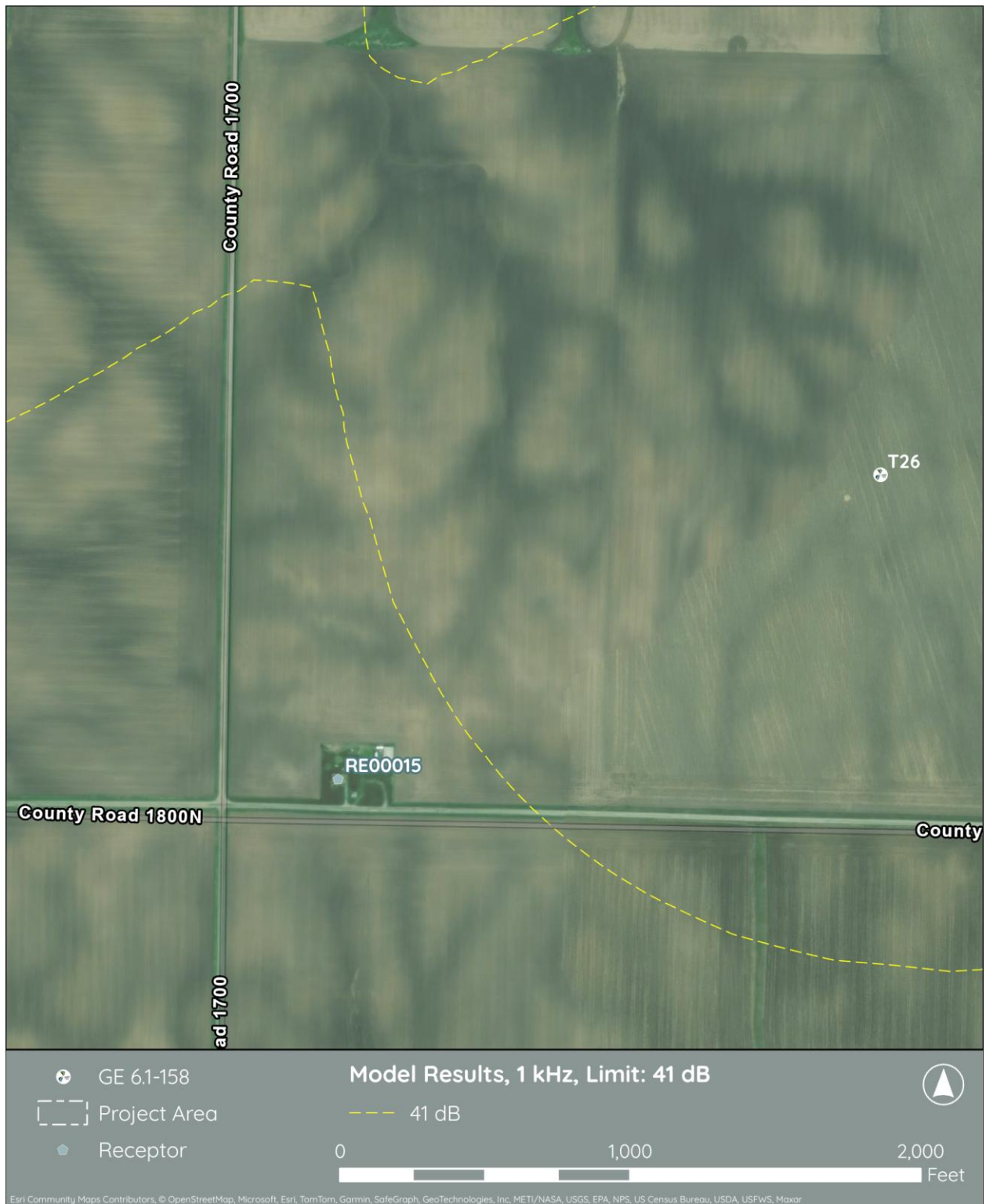


Figure 13: Detailed Model Results Map for the 1 kHz Octave Band, RE00015

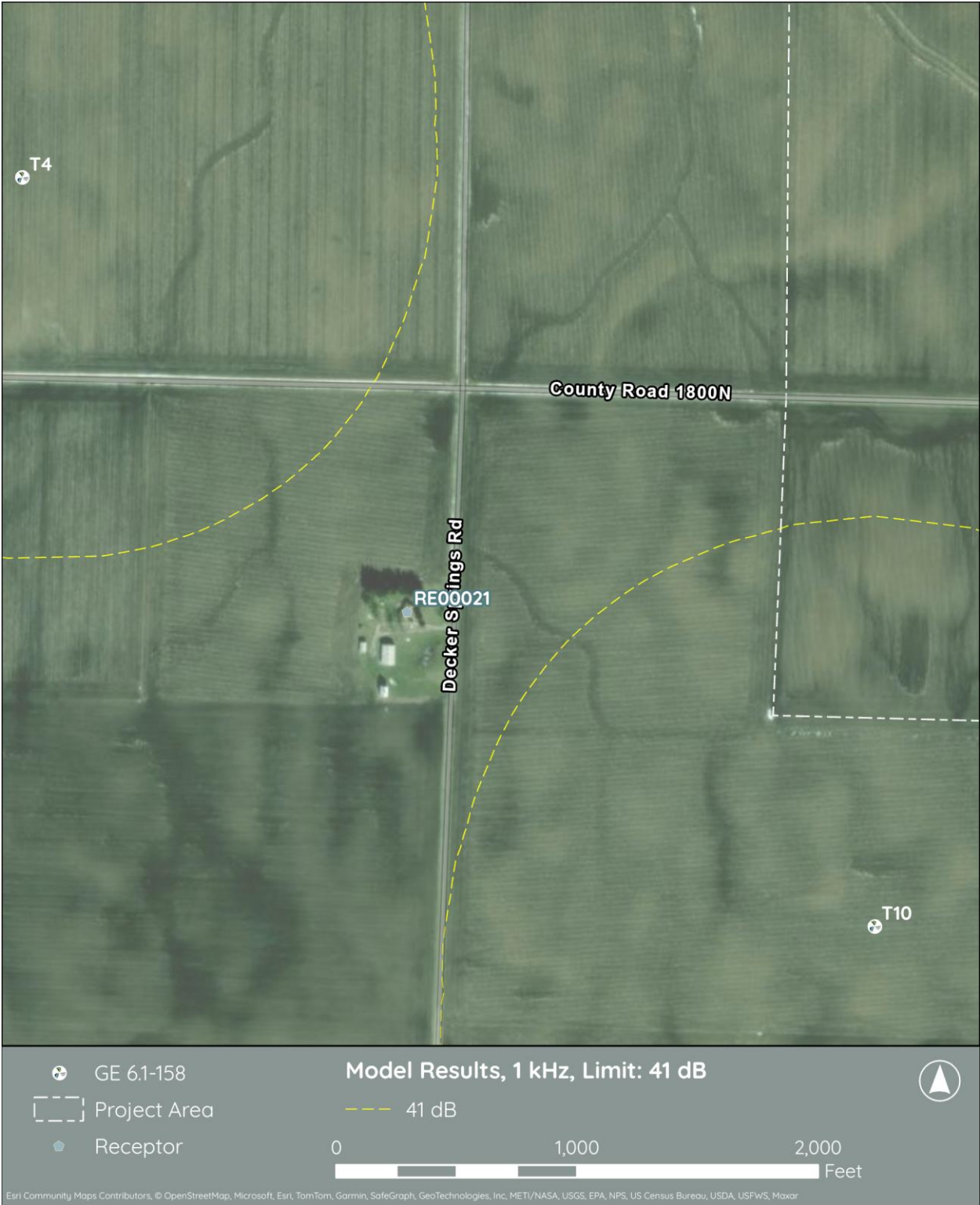


Figure 14: Detailed Model Results Map for the 1 kHz Octave Band, RE00021

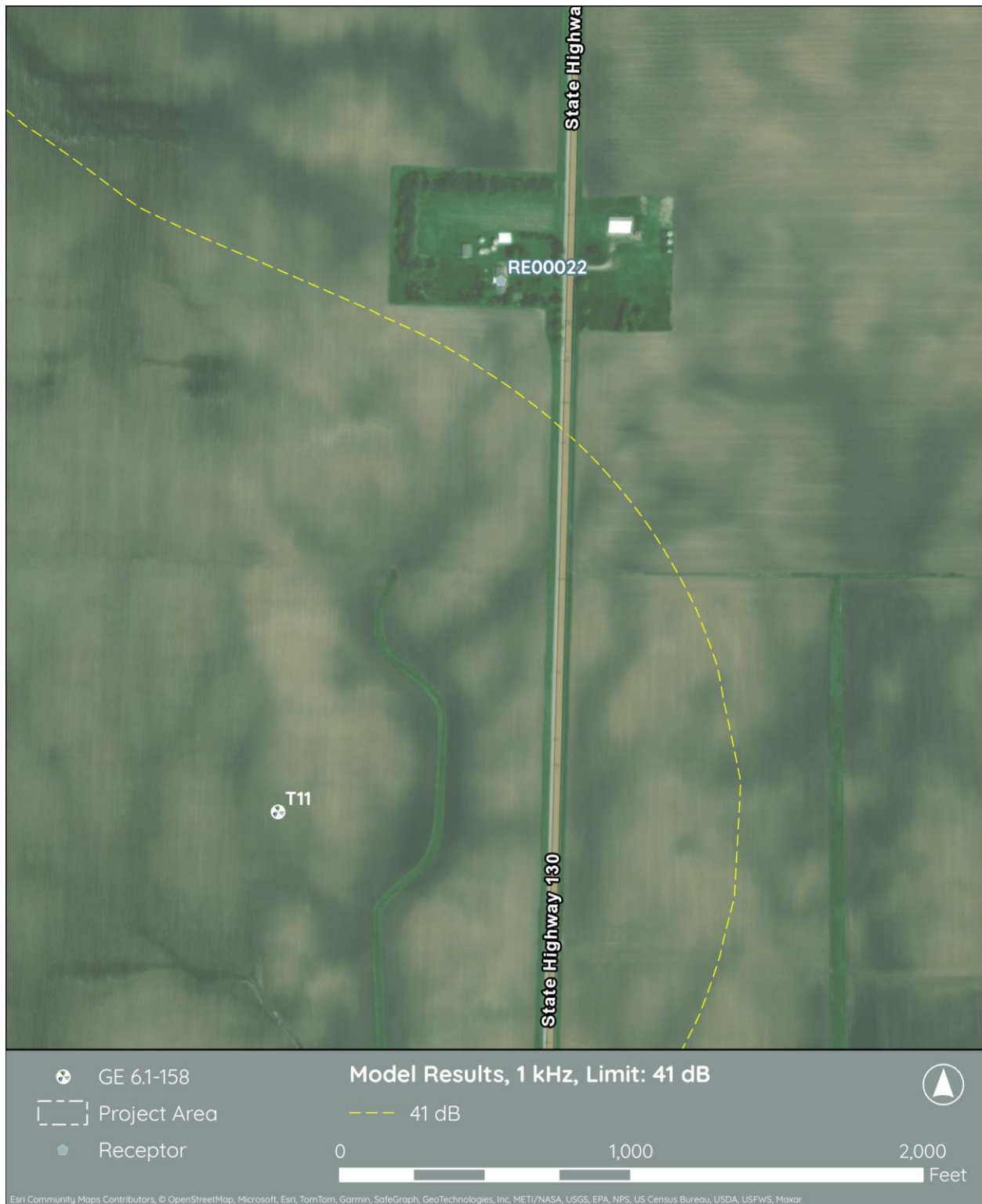


Figure 15: Detailed Model Results Map for the 1 kHz Octave Band, RE00022

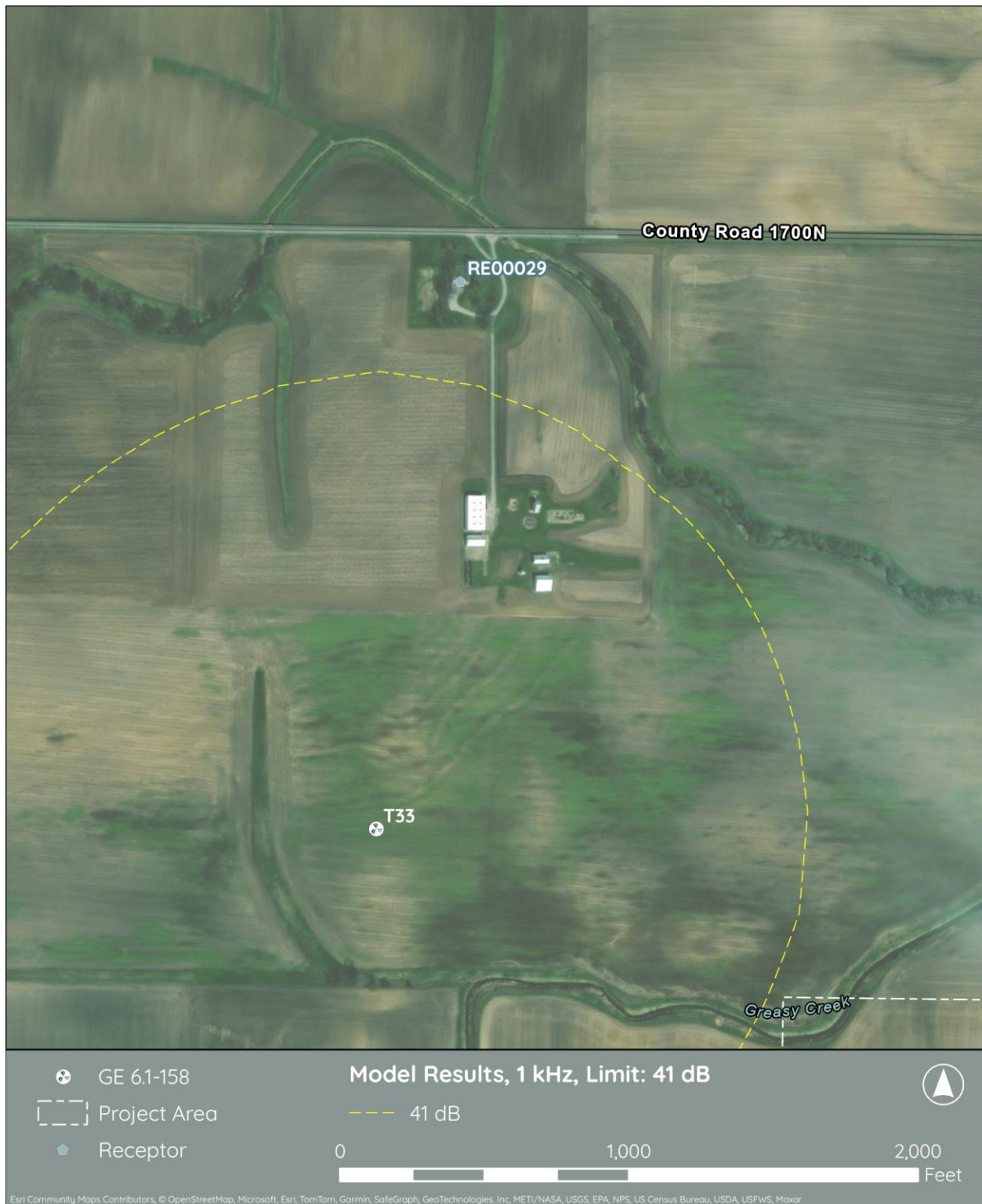


Figure 16: Detailed Model Results Map for the 1 kHz Octave Band, RE00029

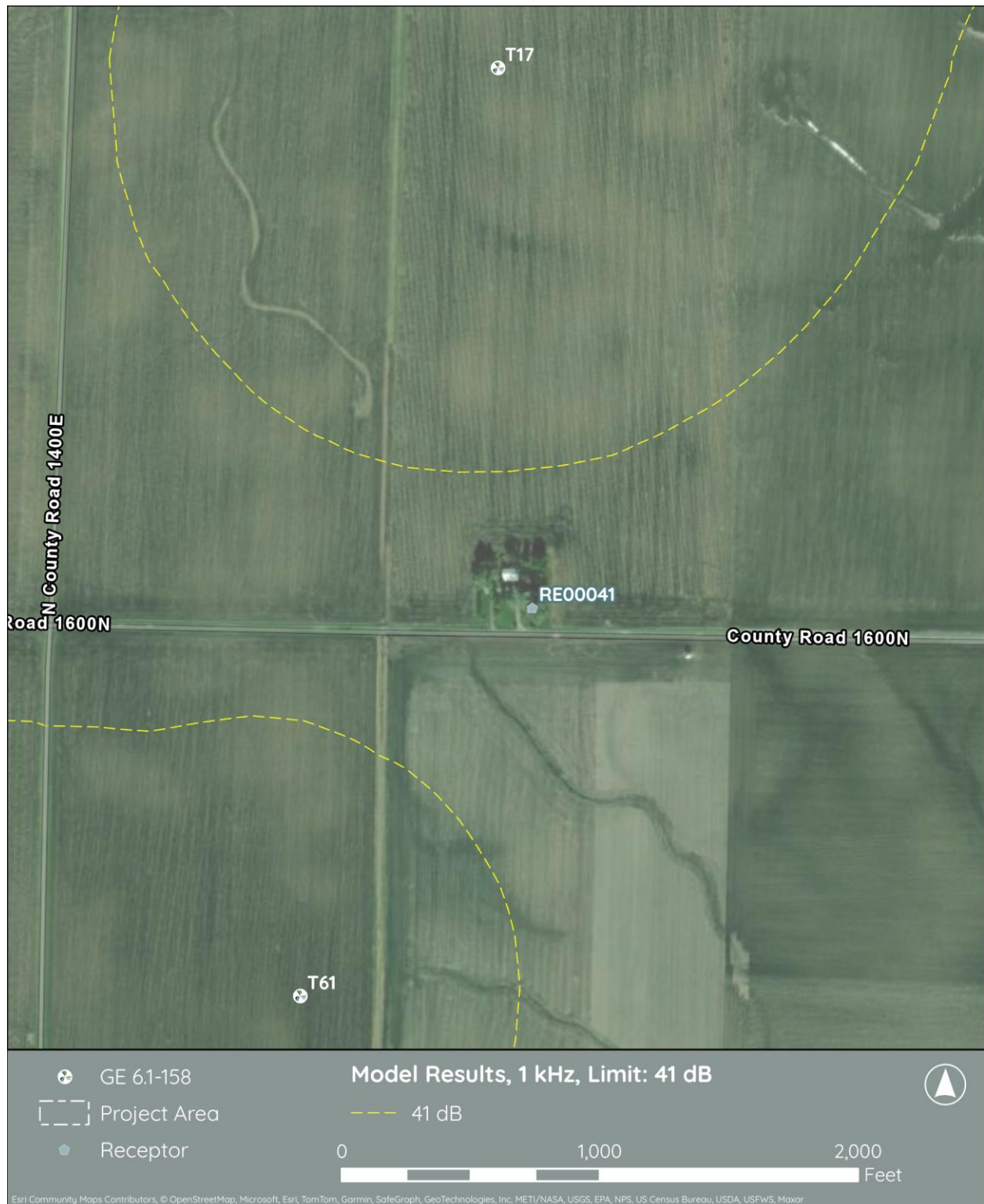


Figure 17: Detailed Model Results Map for the 1 kHz Octave Band, RE00041

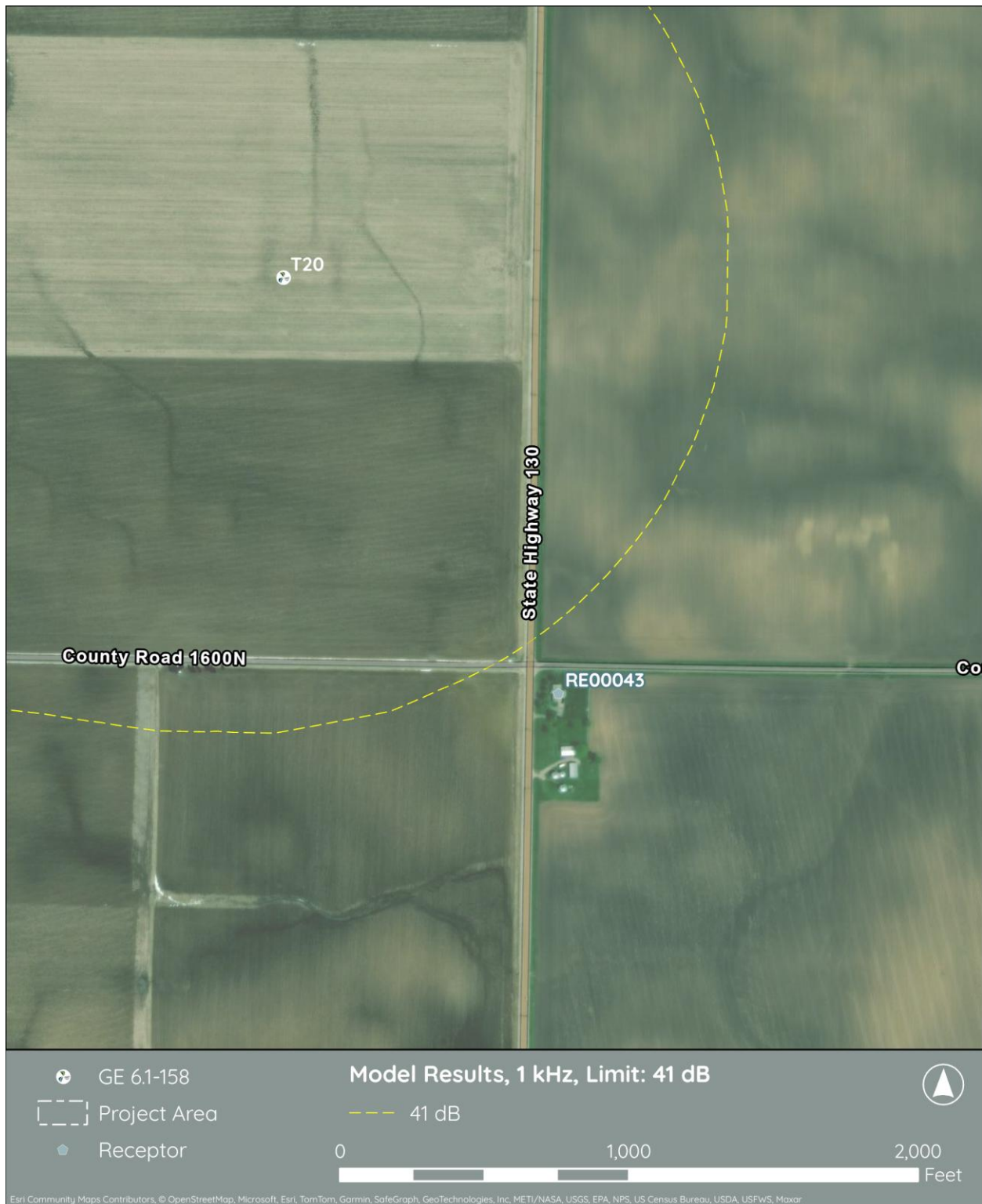


Figure 18: Detailed Model Results Map for the 1 kHz Octave Band, RE00043

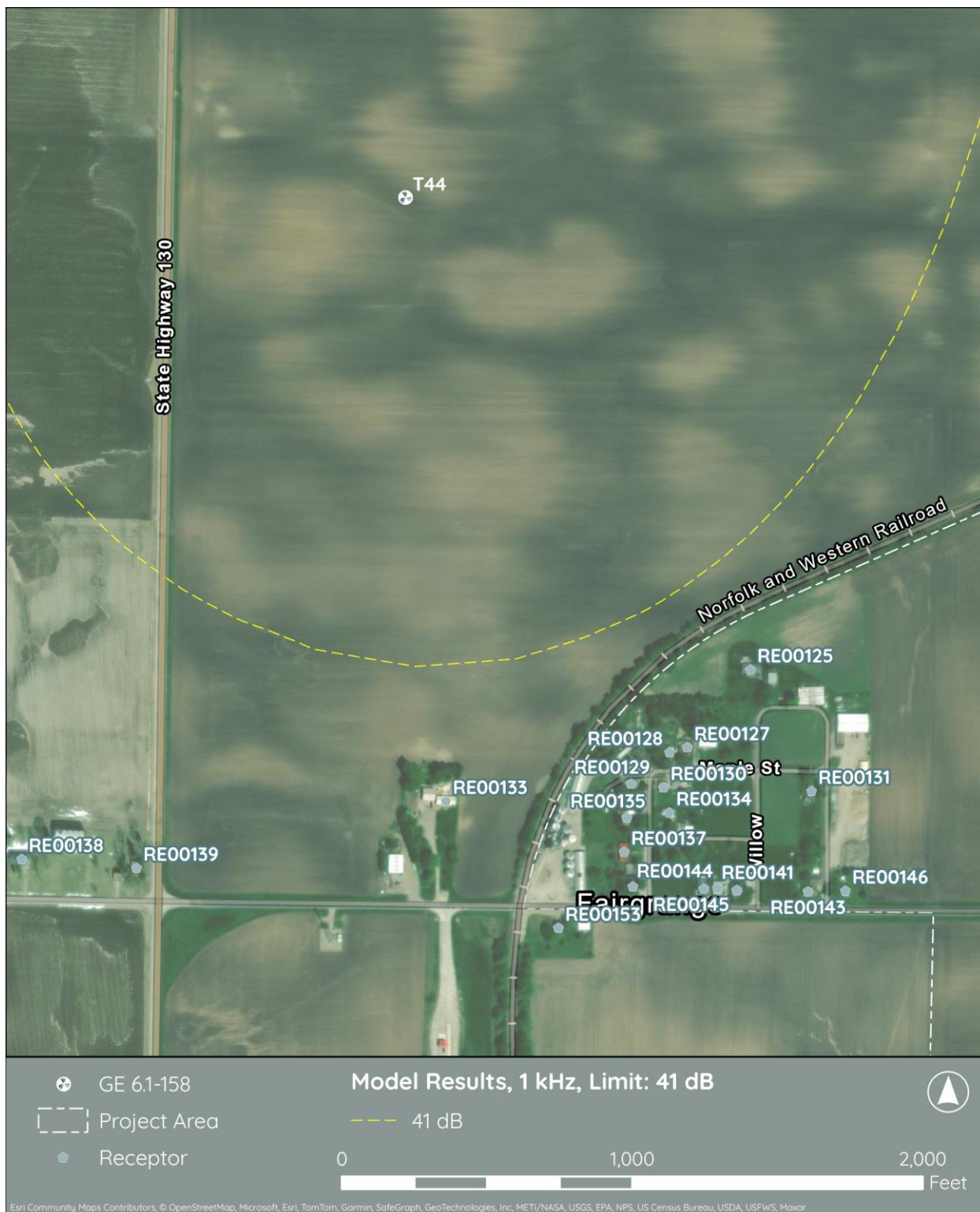


Figure 19: Detailed Model Results Map for the 1 kHz Octave Band, RE000125, RE000127 to RE00129, RE000133, and Other Receptors in Fairgrange

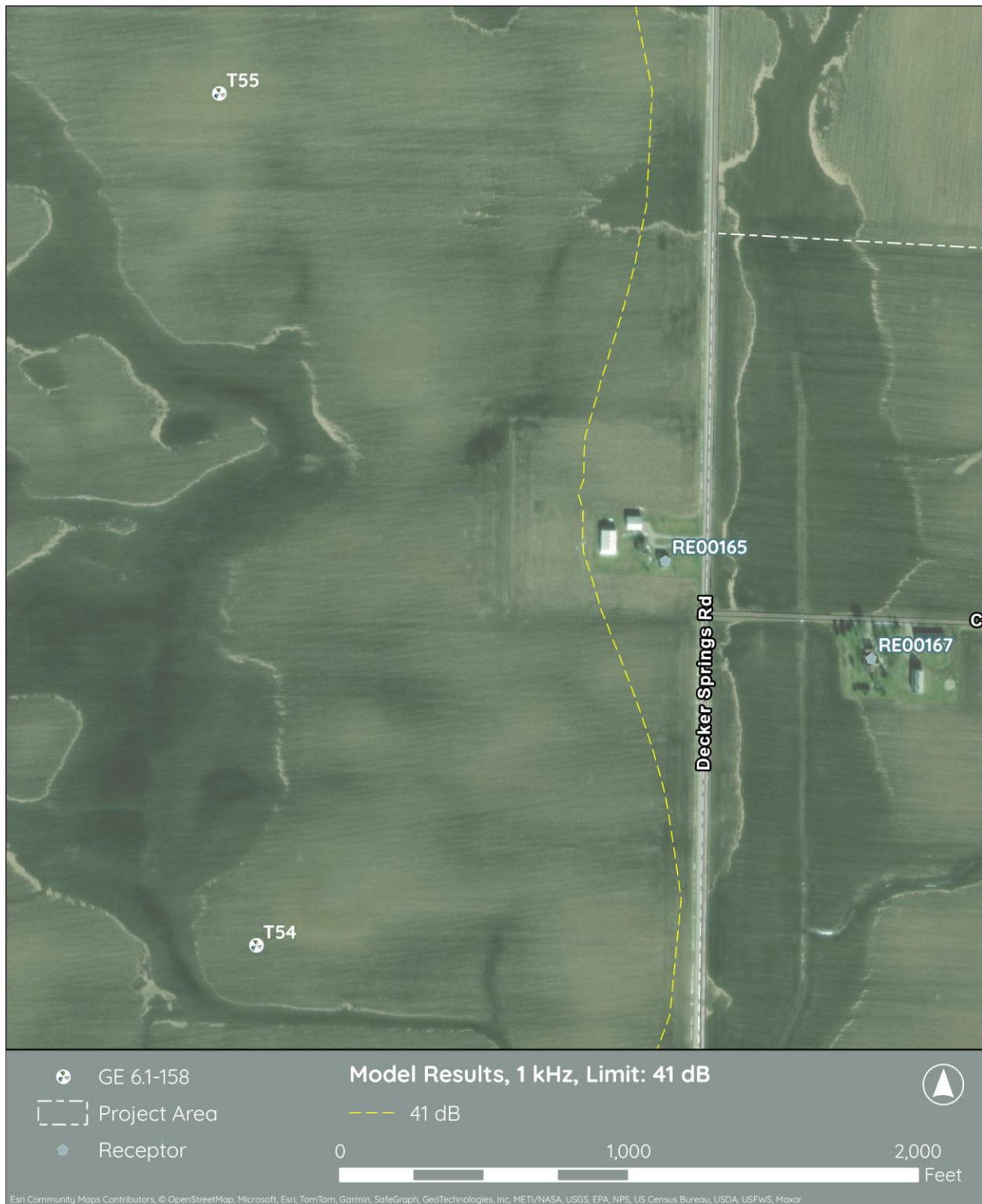


Figure 20: Detailed Model Results Map for the 1 kHz Octave Band, RE000165

## Appendix D: Tabular Model Results & Receptor Maps

Table 7: Tabular Model Results for Each Discrete Receptor<sup>9</sup>

| Receptor ID | Sound Pressure Level (dBZ) by Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates (NAD83 Z16N) |         | Elevation (m) |
|-------------|----------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|--------------------------|---------|---------------|
|             | 31.5                                                                 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                    | Y (m)   |               |
| RE00001     | 56                                                                   | 51 | 42  | 38  | 33  | 27   | 10   | <1   | <1   | 397903                   | 4391423 | 205           |
| RE00002     | 53                                                                   | 49 | 39  | 34  | 29  | 21   | <1   | <1   | <1   | 394405                   | 4391453 | 205           |
| RE00003     | 56                                                                   | 51 | 42  | 38  | 33  | 27   | 10   | <1   | <1   | 399746                   | 4391372 | 205           |
| RE00004     | 59                                                                   | 55 | 46  | 43  | 40  | 36   | 26   | <1   | <1   | 397002                   | 4390082 | 210           |
| RE00005     | 61                                                                   | 56 | 48  | 45  | 42  | 38   | 28   | <1   | <1   | 399427                   | 4389872 | 211           |
| RE00006     | 60                                                                   | 56 | 48  | 45  | 42  | 38   | 30   | 7    | <1   | 400792                   | 4389831 | 213           |
| RE00007     | 55                                                                   | 50 | 41  | 37  | 32  | 26   | 9    | <1   | <1   | 403319                   | 4389790 | 218           |
| RE00008     | 59                                                                   | 55 | 46  | 43  | 40  | 36   | 25   | <1   | <1   | 401224                   | 4389743 | 214           |
| RE00009     | 58                                                                   | 54 | 45  | 42  | 38  | 33   | 20   | <1   | <1   | 395532                   | 4389807 | 210           |
| RE00010     | 57                                                                   | 53 | 44  | 41  | 37  | 32   | 20   | <1   | <1   | 394659                   | 4389784 | 210           |
| RE00011     | 60                                                                   | 56 | 47  | 44  | 41  | 37   | 27   | 2    | <1   | 395901                   | 4389288 | 210           |
| RE00012     | 58                                                                   | 54 | 45  | 41  | 38  | 34   | 23   | <1   | <1   | 402668                   | 4389014 | 221           |
| RE00013     | 62                                                                   | 58 | 49  | 46  | 43  | 40   | 31   | 6    | <1   | 397605                   | 4389070 | 212           |
| RE00014     | 54                                                                   | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 404507                   | 4388318 | 204           |
| RE00015     | 62                                                                   | 58 | 49  | 46  | 43  | 40   | 31   | 8    | <1   | 400718                   | 4388219 | 221           |
| RE00016     | 56                                                                   | 52 | 43  | 39  | 35  | 29   | 15   | <1   | <1   | 392915                   | 4388328 | 213           |
| RE00017     | 55                                                                   | 51 | 42  | 38  | 33  | 27   | 11   | <1   | <1   | 392597                   | 4388273 | 213           |
| RE00018     | 62                                                                   | 57 | 49  | 46  | 43  | 39   | 29   | 7    | <1   | 399992                   | 4388162 | 220           |
| RE00019     | 55                                                                   | 51 | 41  | 37  | 32  | 26   | 8    | <1   | <1   | 404265                   | 4388084 | 202           |
| RE00020     | 55                                                                   | 50 | 41  | 37  | 32  | 26   | 9    | <1   | <1   | 392415                   | 4388185 | 214           |
| RE00021     | 62                                                                   | 58 | 50  | 47  | 44  | 40   | 31   | 6    | <1   | 397355                   | 4387956 | 216           |
| RE00022     | 62                                                                   | 58 | 50  | 47  | 44  | 40   | 31   | 9    | <1   | 398933                   | 4387694 | 219           |
| RE00023     | 61                                                                   | 57 | 48  | 45  | 43  | 39   | 32   | 11   | <1   | 402647                   | 4386878 | 211           |
| RE00024     | 55                                                                   | 51 | 42  | 38  | 34  | 27   | 11   | <1   | <1   | 392571                   | 4386737 | 211           |
| RE00025     | 61                                                                   | 57 | 49  | 46  | 43  | 39   | 29   | 4    | <1   | 396447                   | 4386671 | 213           |
| RE00026     | 56                                                                   | 52 | 43  | 40  | 36  | 30   | 17   | <1   | <1   | 392982                   | 4386722 | 212           |
| RE00027     | 62                                                                   | 58 | 49  | 46  | 43  | 39   | 31   | 9    | <1   | 399852                   | 4386608 | 213           |
| RE00028     | 61                                                                   | 57 | 48  | 45  | 43  | 38   | 30   | 5    | <1   | 394874                   | 4386627 | 213           |
| RE00029     | 62                                                                   | 58 | 49  | 46  | 43  | 40   | 32   | 10   | <1   | 402056                   | 4386494 | 211           |
| RE00030     | 58                                                                   | 53 | 44  | 41  | 38  | 34   | 25   | <1   | <1   | 404385                   | 4386445 | 206           |
| RE00031     | 60                                                                   | 55 | 47  | 44  | 41  | 36   | 27   | 5    | <1   | 394176                   | 4386532 | 213           |

<sup>9</sup> Maps of the receptor locations showing the receptor IDs are provided following the table.

| Receptor ID | Sound Pressure Level (dBZ) by<br>Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates<br>(NAD83 Z16N) |         | Elevation<br>(m) |
|-------------|-------------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|-----------------------------|---------|------------------|
|             | 31.5                                                                    | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                       | Y (m)   |                  |
| RE00032     | 62                                                                      | 57 | 49  | 46  | 42  | 38   | 28   | <1   | <1   | 399227                      | 4385987 | 213              |
| RE00033     | 49                                                                      | 45 | 38  | 34  | 29  | 24   | 9    | <1   | <1   | 405403                      | 4385536 | 200              |
| RE00034     | 52                                                                      | 47 | 40  | 35  | 30  | 23   | 7    | <1   | <1   | 405376                      | 4385395 | 205              |
| RE00035     | 59                                                                      | 55 | 46  | 43  | 40  | 35   | 25   | <1   | <1   | 402705                      | 4385328 | 207              |
| RE00036     | 61                                                                      | 57 | 49  | 46  | 43  | 39   | 30   | 3    | <1   | 400166                      | 4385091 | 216              |
| RE00037     | 55                                                                      | 51 | 42  | 37  | 33  | 27   | 12   | <1   | <1   | 404839                      | 4384948 | 208              |
| RE00038     | 58                                                                      | 54 | 45  | 41  | 37  | 32   | 21   | <1   | <1   | 403535                      | 4384965 | 208              |
| RE00039     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 25   | <1   | <1   | 402153                      | 4384985 | 205              |
| RE00040     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 6    | <1   | <1   | 405410                      | 4384935 | 205              |
| RE00041     | 61                                                                      | 57 | 49  | 47  | 45  | 40   | 31   | 10   | <1   | 396327                      | 4385058 | 210              |
| RE00042     | 59                                                                      | 55 | 46  | 43  | 39  | 35   | 23   | <1   | <1   | 402407                      | 4384911 | 208              |
| RE00043     | 62                                                                      | 58 | 49  | 46  | 43  | 40   | 32   | 13   | <1   | 398977                      | 4384956 | 214              |
| RE00044     | 58                                                                      | 54 | 44  | 41  | 37  | 31   | 18   | <1   | <1   | 403374                      | 4384727 | 210              |
| RE00045     | 57                                                                      | 53 | 44  | 40  | 36  | 31   | 16   | <1   | <1   | 403480                      | 4384631 | 213              |
| RE00046     | 54                                                                      | 50 | 40  | 36  | 30  | 23   | 4    | <1   | <1   | 405470                      | 4384583 | 206              |
| RE00047     | 54                                                                      | 50 | 40  | 36  | 31  | 23   | 4    | <1   | <1   | 405455                      | 4384536 | 206              |
| RE00048     | 55                                                                      | 50 | 41  | 36  | 31  | 24   | 6    | <1   | <1   | 405205                      | 4384475 | 207              |
| RE00049     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405376                      | 4384461 | 207              |
| RE00050     | 53                                                                      | 49 | 41  | 36  | 31  | 25   | 7    | <1   | <1   | 405126                      | 4384455 | 207              |
| RE00051     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405360                      | 4384426 | 207              |
| RE00052     | 53                                                                      | 49 | 41  | 36  | 31  | 25   | 7    | <1   | <1   | 405122                      | 4384428 | 207              |
| RE00053     | 55                                                                      | 51 | 41  | 37  | 32  | 25   | 7    | <1   | <1   | 405084                      | 4384427 | 207              |
| RE00054     | 55                                                                      | 50 | 41  | 36  | 31  | 24   | 5    | <1   | <1   | 405301                      | 4384418 | 207              |
| RE00055     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405374                      | 4384415 | 207              |
| RE00056     | 55                                                                      | 50 | 41  | 36  | 31  | 24   | 6    | <1   | <1   | 405222                      | 4384416 | 207              |
| RE00057     | 54                                                                      | 50 | 40  | 36  | 30  | 23   | 3    | <1   | <1   | 405529                      | 4384377 | 208              |
| RE00058     | 54                                                                      | 50 | 40  | 36  | 31  | 23   | 4    | <1   | <1   | 405458                      | 4384373 | 207              |
| RE00059     | 53                                                                      | 49 | 40  | 35  | 30  | 23   | 3    | <1   | <1   | 405586                      | 4384368 | 208              |
| RE00060     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405338                      | 4384369 | 207              |
| RE00061     | 55                                                                      | 50 | 41  | 37  | 32  | 25   | 6    | <1   | <1   | 405176                      | 4384338 | 206              |
| RE00062     | 54                                                                      | 50 | 41  | 36  | 31  | 24   | 5    | <1   | <1   | 405325                      | 4384333 | 207              |
| RE00063     | 58                                                                      | 54 | 46  | 43  | 43  | 34   | 23   | <1   | <1   | 394166                      | 4384498 | 208              |
| RE00064     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405375                      | 4384330 | 207              |
| RE00065     | 55                                                                      | 50 | 41  | 36  | 31  | 24   | 6    | <1   | <1   | 405271                      | 4384320 | 207              |
| RE00066     | 55                                                                      | 51 | 41  | 37  | 32  | 25   | 7    | <1   | <1   | 405107                      | 4384307 | 206              |
| RE00067     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 5    | <1   | <1   | 405415                      | 4384279 | 207              |
| RE00068     | 54                                                                      | 49 | 40  | 35  | 30  | 22   | 2    | <1   | <1   | 405695                      | 4384275 | 208              |
| RE00069     | 54                                                                      | 50 | 40  | 36  | 31  | 23   | 4    | <1   | <1   | 405458                      | 4384278 | 208              |

| Receptor ID | Sound Pressure Level (dBZ) by<br>Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates<br>(NAD83 Z16N) |         | Elevation<br>(m) |
|-------------|-------------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|-----------------------------|---------|------------------|
|             | 31.5                                                                    | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                       | Y (m)   |                  |
| RE00070     | 60                                                                      | 55 | 47  | 43  | 40  | 34   | 21   | <1   | <1   | 397382                      | 4384397 | 217              |
| RE00071     | 52                                                                      | 48 | 39  | 35  | 30  | 22   | 2    | <1   | <1   | 405677                      | 4384238 | 208              |
| RE00072     | 54                                                                      | 49 | 40  | 35  | 30  | 22   | 2    | <1   | <1   | 405766                      | 4384230 | 207              |
| RE00073     | 54                                                                      | 50 | 40  | 36  | 31  | 23   | 4    | <1   | <1   | 405518                      | 4384231 | 210              |
| RE00074     | 55                                                                      | 51 | 42  | 38  | 35  | 27   | 9    | <1   | <1   | 392935                      | 4384414 | 207              |
| RE00075     | 54                                                                      | 50 | 40  | 36  | 31  | 24   | 4    | <1   | <1   | 405460                      | 4384220 | 208              |
| RE00076     | 54                                                                      | 49 | 40  | 35  | 30  | 23   | 3    | <1   | <1   | 405586                      | 4384208 | 210              |
| RE00077     | 59                                                                      | 55 | 46  | 43  | 40  | 34   | 20   | <1   | <1   | 397277                      | 4384327 | 217              |
| RE00078     | 54                                                                      | 49 | 40  | 36  | 30  | 23   | 4    | <1   | <1   | 405544                      | 4384157 | 208              |
| RE00079     | 54                                                                      | 49 | 40  | 36  | 31  | 23   | 4    | <1   | <1   | 405530                      | 4384101 | 208              |
| RE00080     | 54                                                                      | 49 | 40  | 35  | 30  | 22   | 2    | <1   | <1   | 405767                      | 4384101 | 206              |
| RE00081     | 61                                                                      | 57 | 48  | 45  | 41  | 38   | 27   | <1   | <1   | 400113                      | 4383547 | 209              |
| RE00082     | 58                                                                      | 54 | 45  | 42  | 38  | 33   | 22   | <1   | <1   | 403233                      | 4383499 | 209              |
| RE00083     | 56                                                                      | 52 | 43  | 39  | 35  | 30   | 17   | <1   | <1   | 392864                      | 4383605 | 209              |
| RE00084     | 59                                                                      | 54 | 46  | 43  | 40  | 33   | 20   | <1   | <1   | 396513                      | 4383543 | 215              |
| RE00085     | 60                                                                      | 56 | 48  | 45  | 41  | 38   | 29   | 7    | <1   | 402276                      | 4383452 | 208              |
| RE00086     | 60                                                                      | 56 | 48  | 44  | 41  | 38   | 29   | 6    | <1   | 402277                      | 4383411 | 208              |
| RE00087     | 61                                                                      | 57 | 48  | 45  | 42  | 39   | 31   | 10   | <1   | 402161                      | 4383400 | 208              |
| RE00088     | 61                                                                      | 57 | 48  | 45  | 42  | 38   | 30   | 8    | <1   | 402192                      | 4383398 | 208              |
| RE00089     | 61                                                                      | 57 | 48  | 45  | 42  | 39   | 31   | 9    | <1   | 402177                      | 4383398 | 208              |
| RE00090     | 61                                                                      | 57 | 48  | 45  | 42  | 39   | 31   | 9    | <1   | 402161                      | 4383365 | 208              |
| RE00091     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 29   | 4    | <1   | 402278                      | 4383362 | 208              |
| RE00092     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 28   | 3    | <1   | 402305                      | 4383360 | 208              |
| RE00093     | 59                                                                      | 55 | 46  | 43  | 40  | 35   | 26   | <1   | <1   | 394101                      | 4383480 | 211              |
| RE00094     | 56                                                                      | 52 | 43  | 40  | 36  | 31   | 20   | <1   | <1   | 404763                      | 4383286 | 209              |
| RE00095     | 59                                                                      | 55 | 46  | 43  | 39  | 35   | 24   | <1   | <1   | 402551                      | 4383303 | 209              |
| RE00096     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 28   | 2    | <1   | 402289                      | 4383304 | 208              |
| RE00097     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 27   | <1   | <1   | 402336                      | 4383292 | 209              |
| RE00098     | 61                                                                      | 56 | 48  | 45  | 41  | 38   | 29   | 6    | <1   | 402184                      | 4383295 | 208              |
| RE00099     | 59                                                                      | 55 | 46  | 43  | 39  | 35   | 25   | 3    | <1   | 403234                      | 4383236 | 208              |
| RE00100     | 59                                                                      | 54 | 46  | 42  | 38  | 33   | 22   | <1   | <1   | 402942                      | 4383239 | 208              |
| RE00101     | 54                                                                      | 50 | 40  | 36  | 31  | 25   | 8    | <1   | <1   | 405748                      | 4383192 | 208              |
| RE00102     | 59                                                                      | 55 | 46  | 43  | 39  | 34   | 21   | <1   | <1   | 398190                      | 4383294 | 211              |
| RE00103     | 58                                                                      | 54 | 45  | 42  | 39  | 35   | 26   | 3    | <1   | 404347                      | 4383201 | 208              |
| RE00104     | 59                                                                      | 55 | 46  | 43  | 41  | 35   | 23   | <1   | <1   | 395068                      | 4383338 | 214              |
| RE00105     | 60                                                                      | 55 | 47  | 43  | 40  | 36   | 25   | <1   | <1   | 402375                      | 4383194 | 209              |
| RE00106     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 27   | <1   | <1   | 402270                      | 4383170 | 208              |
| RE00107     | 60                                                                      | 55 | 47  | 43  | 40  | 36   | 25   | <1   | <1   | 402370                      | 4383164 | 209              |

| Receptor ID | Sound Pressure Level (dBZ) by<br>Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates<br>(NAD83 Z16N) |         | Elevation<br>(m) |
|-------------|-------------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|-----------------------------|---------|------------------|
|             | 31.5                                                                    | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                       | Y (m)   |                  |
| RE00108     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 27   | <1   | <1   | 402219                      | 4383165 | 209              |
| RE00109     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 28   | 1    | <1   | 402159                      | 4383130 | 208              |
| RE00110     | 60                                                                      | 55 | 47  | 43  | 40  | 36   | 25   | <1   | <1   | 402322                      | 4383121 | 208              |
| RE00111     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 27   | <1   | <1   | 402221                      | 4383103 | 208              |
| RE00112     | 60                                                                      | 55 | 47  | 43  | 40  | 35   | 25   | <1   | <1   | 402336                      | 4383071 | 208              |
| RE00113     | 59                                                                      | 55 | 46  | 43  | 39  | 35   | 24   | <1   | <1   | 402425                      | 4383063 | 208              |
| RE00114     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 26   | <1   | <1   | 402213                      | 4383063 | 208              |
| RE00115     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 27   | <1   | <1   | 402153                      | 4383058 | 208              |
| RE00116     | 59                                                                      | 55 | 46  | 43  | 39  | 35   | 24   | <1   | <1   | 402366                      | 4383017 | 208              |
| RE00117     | 60                                                                      | 56 | 47  | 44  | 40  | 36   | 26   | <1   | <1   | 402209                      | 4383014 | 208              |
| RE00118     | 60                                                                      | 55 | 47  | 43  | 40  | 35   | 25   | <1   | <1   | 402294                      | 4383009 | 208              |
| RE00119     | 59                                                                      | 54 | 45  | 42  | 38  | 32   | 17   | <1   | <1   | 397355                      | 4382959 | 215              |
| RE00120     | 58                                                                      | 54 | 45  | 42  | 39  | 35   | 25   | <1   | <1   | 392843                      | 4382684 | 210              |
| RE00121     | 60                                                                      | 56 | 48  | 44  | 41  | 37   | 27   | <1   | <1   | 400280                      | 4382529 | 214              |
| RE00122     | 59                                                                      | 54 | 46  | 42  | 38  | 33   | 19   | <1   | <1   | 397298                      | 4382470 | 213              |
| RE00123     | 52                                                                      | 48 | 38  | 34  | 29  | 23   | 5    | <1   | <1   | 391317                      | 4382510 | 208              |
| RE00124     | 60                                                                      | 56 | 48  | 45  | 42  | 38   | 29   | 2    | <1   | 403361                      | 4381892 | 214              |
| RE00125     | 62                                                                      | 58 | 49  | 46  | 43  | 40   | 32   | 9    | <1   | 399518                      | 4381947 | 212              |
| RE00126     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 26   | <1   | <1   | 400439                      | 4381875 | 212              |
| RE00127     | 62                                                                      | 58 | 49  | 46  | 43  | 40   | 31   | 8    | <1   | 399452                      | 4381865 | 211              |
| RE00128     | 62                                                                      | 58 | 49  | 46  | 43  | 40   | 31   | 8    | <1   | 399433                      | 4381860 | 211              |
| RE00129     | 62                                                                      | 57 | 49  | 46  | 43  | 40   | 31   | 7    | <1   | 399393                      | 4381827 | 211              |
| RE00130     | 62                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399427                      | 4381823 | 211              |
| RE00131     | 61                                                                      | 57 | 48  | 45  | 42  | 39   | 30   | 5    | <1   | 399582                      | 4381820 | 211              |
| RE00132     | 59                                                                      | 55 | 47  | 44  | 41  | 38   | 31   | 9    | <1   | 392883                      | 4381906 | 213              |
| RE00133     | 62                                                                      | 57 | 49  | 46  | 43  | 40   | 31   | 8    | <1   | 399198                      | 4381809 | 212              |
| RE00134     | 62                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 6    | <1   | 399433                      | 4381797 | 211              |
| RE00135     | 62                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399388                      | 4381792 | 211              |
| RE00136     | 61                                                                      | 57 | 48  | 46  | 43  | 39   | 31   | 8    | <1   | 396247                      | 4381804 | 212              |
| RE00137     | 61                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399385                      | 4381756 | 211              |
| RE00138     | 60                                                                      | 56 | 47  | 44  | 41  | 37   | 28   | <1   | <1   | 398753                      | 4381748 | 209              |
| RE00139     | 61                                                                      | 57 | 48  | 45  | 41  | 38   | 29   | 3    | <1   | 398874                      | 4381739 | 210              |
| RE00140     | 59                                                                      | 55 | 46  | 43  | 39  | 34   | 23   | <1   | <1   | 397514                      | 4381759 | 210              |
| RE00141     | 61                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399483                      | 4381717 | 211              |
| RE00142     | 61                                                                      | 56 | 48  | 45  | 42  | 38   | 29   | 4    | <1   | 402799                      | 4381671 | 209              |
| RE00143     | 61                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399578                      | 4381714 | 211              |
| RE00144     | 62                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399395                      | 4381719 | 211              |
| RE00145     | 62                                                                      | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399469                      | 4381717 | 211              |

| Receptor ID | Sound Pressure Level (dBZ) by Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates (NAD83 Z16N) |         | Elevation (m) |
|-------------|----------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|--------------------------|---------|---------------|
|             | 31.5                                                                 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                    | Y (m)   |               |
| RE00146     | 61                                                                   | 57 | 48  | 45  | 42  | 39   | 31   | 6    | <1   | 399618                   | 4381715 | 211           |
| RE00147     | 61                                                                   | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399504                   | 4381716 | 211           |
| RE00148     | 60                                                                   | 56 | 47  | 44  | 41  | 37   | 26   | <1   | <1   | 402090                   | 4381655 | 210           |
| RE00149     | 60                                                                   | 56 | 48  | 45  | 42  | 38   | 30   | 7    | <1   | 395664                   | 4381746 | 214           |
| RE00150     | 60                                                                   | 56 | 47  | 44  | 41  | 37   | 27   | <1   | <1   | 401290                   | 4381655 | 209           |
| RE00151     | 61                                                                   | 57 | 48  | 45  | 42  | 38   | 29   | 5    | <1   | 401063                   | 4381654 | 209           |
| RE00152     | 61                                                                   | 57 | 48  | 45  | 42  | 38   | 30   | 6    | <1   | 400991                   | 4381655 | 209           |
| RE00153     | 61                                                                   | 57 | 49  | 46  | 43  | 39   | 31   | 7    | <1   | 399316                   | 4381676 | 212           |
| RE00154     | 61                                                                   | 57 | 48  | 45  | 42  | 39   | 30   | 7    | <1   | 395870                   | 4381726 | 213           |
| RE00155     | 61                                                                   | 57 | 48  | 45  | 42  | 38   | 30   | 6    | <1   | 401020                   | 4381645 | 209           |
| RE00156     | 59                                                                   | 54 | 46  | 43  | 39  | 35   | 24   | <1   | <1   | 394483                   | 4381721 | 217           |
| RE00157     | 61                                                                   | 57 | 48  | 45  | 42  | 39   | 30   | 4    | <1   | 403368                   | 4381581 | 211           |
| RE00158     | 61                                                                   | 57 | 48  | 45  | 42  | 39   | 30   | 8    | <1   | 401020                   | 4381615 | 209           |
| RE00159     | 61                                                                   | 57 | 48  | 45  | 42  | 38   | 30   | 7    | <1   | 401063                   | 4381609 | 209           |
| RE00160     | 61                                                                   | 57 | 48  | 45  | 42  | 39   | 30   | 8    | <1   | 400990                   | 4381610 | 209           |
| RE00161     | 60                                                                   | 55 | 47  | 43  | 40  | 36   | 26   | <1   | <1   | 398684                   | 4381311 | 211           |
| RE00162     | 60                                                                   | 56 | 48  | 45  | 41  | 38   | 30   | 7    | <1   | 397375                   | 4381284 | 210           |
| RE00163     | 57                                                                   | 53 | 44  | 41  | 38  | 34   | 24   | <1   | <1   | 393663                   | 4381091 | 214           |
| RE00164     | 55                                                                   | 51 | 42  | 38  | 35  | 30   | 17   | <1   | <1   | 393646                   | 4380645 | 213           |
| RE00165     | 61                                                                   | 57 | 49  | 46  | 43  | 40   | 33   | 11   | <1   | 397243                   | 4380578 | 211           |
| RE00166     | 59                                                                   | 55 | 46  | 43  | 39  | 35   | 26   | <1   | <1   | 398898                   | 4380496 | 212           |
| RE00167     | 60                                                                   | 56 | 47  | 44  | 41  | 38   | 29   | 4    | <1   | 397460                   | 4380474 | 209           |
| RE00168     | 56                                                                   | 51 | 43  | 39  | 36  | 31   | 20   | <1   | <1   | 404770                   | 4380330 | 209           |
| RE00169     | 54                                                                   | 50 | 40  | 37  | 32  | 27   | 12   | <1   | <1   | 405358                   | 4380224 | 207           |
| RE00170     | 55                                                                   | 50 | 41  | 37  | 33  | 27   | 12   | <1   | <1   | 393719                   | 4380326 | 213           |
| RE00171     | 54                                                                   | 50 | 41  | 37  | 33  | 28   | 14   | <1   | <1   | 405066                   | 4380092 | 209           |
| RE00172     | 58                                                                   | 53 | 44  | 41  | 37  | 32   | 20   | <1   | <1   | 398782                   | 4380143 | 214           |
| RE00173     | 60                                                                   | 56 | 47  | 44  | 41  | 38   | 30   | 7    | <1   | 400444                   | 4379833 | 213           |
| RE00174     | 46                                                                   | 42 | 37  | 32  | 28  | 24   | 9    | <1   | <1   | 405026                   | 4379761 | 195           |
| RE00175     | 59                                                                   | 55 | 47  | 44  | 40  | 37   | 27   | <1   | <1   | 401705                   | 4379711 | 213           |
| RE00176     | 57                                                                   | 52 | 43  | 40  | 36  | 31   | 19   | <1   | <1   | 395619                   | 4379791 | 213           |
| RE00177     | 53                                                                   | 49 | 40  | 35  | 31  | 24   | 6    | <1   | <1   | 393704                   | 4379796 | 212           |
| RE00178     | 59                                                                   | 55 | 47  | 44  | 41  | 37   | 28   | 7    | <1   | 402483                   | 4379636 | 214           |
| RE00179     | 59                                                                   | 54 | 46  | 43  | 40  | 36   | 27   | 6    | <1   | 402968                   | 4379612 | 213           |
| RE00180     | 57                                                                   | 52 | 43  | 40  | 36  | 32   | 20   | <1   | <1   | 395775                   | 4379681 | 211           |
| RE00181     | 54                                                                   | 50 | 41  | 37  | 33  | 27   | 11   | <1   | <1   | 404617                   | 4379511 | 209           |
| RE00182     | 58                                                                   | 54 | 45  | 42  | 39  | 35   | 26   | <1   | <1   | 400514                   | 4379487 | 214           |
| RE00183     | 50                                                                   | 46 | 40  | 35  | 29  | 23   | 4    | <1   | <1   | 404481                   | 4378936 | 208           |

| Receptor ID                                    | Sound Pressure Level (dBZ) by<br>Full Octave Band Center Frequency (Hz) |    |     |     |     |      |      |      |      | Coordinates<br>(NAD83 Z16N) |         | Elevation<br>(m) |
|------------------------------------------------|-------------------------------------------------------------------------|----|-----|-----|-----|------|------|------|------|-----------------------------|---------|------------------|
|                                                | 31.5                                                                    | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | X (m)                       | Y (m)   |                  |
| RE00184                                        | 55                                                                      | 51 | 42  | 37  | 33  | 26   | 8    | <1   | <1   | 398890                      | 4378997 | 213              |
| RE00185                                        | 56                                                                      | 52 | 43  | 39  | 35  | 31   | 17   | <1   | <1   | 401520                      | 4378905 | 215              |
| RE00186                                        | 50                                                                      | 45 | 39  | 35  | 30  | 23   | 5    | <1   | <1   | 404100                      | 4378739 | 211              |
| RE00187                                        | 52                                                                      | 48 | 40  | 36  | 31  | 25   | 7    | <1   | <1   | 403681                      | 4378611 | 217              |
| RE00188                                        | 55                                                                      | 50 | 41  | 37  | 32  | 25   | 7    | <1   | <1   | 399664                      | 4378511 | 214              |
| RE00189                                        | 54                                                                      | 50 | 40  | 36  | 31  | 25   | 8    | <1   | <1   | 397769                      | 4378510 | 212              |
| RE00190                                        | 52                                                                      | 47 | 39  | 35  | 31  | 24   | 7    | <1   | <1   | 403303                      | 4378403 | 217              |
| RE00191                                        | 54                                                                      | 50 | 40  | 36  | 30  | 23   | 2    | <1   | <1   | 398874                      | 4378362 | 213              |
| RE00192                                        | 52                                                                      | 48 | 40  | 36  | 31  | 24   | 7    | <1   | <1   | 400825                      | 4378105 | 216              |
| RE00193                                        | 52                                                                      | 48 | 38  | 34  | 29  | 22   | <1   | <1   | <1   | 403778                      | 4378054 | 214              |
| RE00194                                        | 53                                                                      | 49 | 40  | 35  | 30  | 23   | 6    | <1   | <1   | 397218                      | 4378151 | 211              |
| RE00195                                        | 52                                                                      | 48 | 38  | 34  | 28  | 21   | <1   | <1   | <1   | 404015                      | 4378044 | 211              |
| RE00196                                        | 52                                                                      | 48 | 39  | 34  | 29  | 22   | <1   | <1   | <1   | 403347                      | 4377907 | 213              |
| CB00197                                        | 60                                                                      | 56 | 48  | 45  | 42  | 38   | 29   | 9    | <1   | 394183                      | 4386647 | 213              |
| <b>Maximum Results</b>                         | 62                                                                      | 58 | 50  | 47  | 45  | 40   | 33   | 13   | <1   |                             |         |                  |
| <b>IPCB Class C to Class A Nighttime Limit</b> | 69                                                                      | 67 | 62  | 54  | 47  | 41   | 36   | 32   | 32   |                             |         |                  |

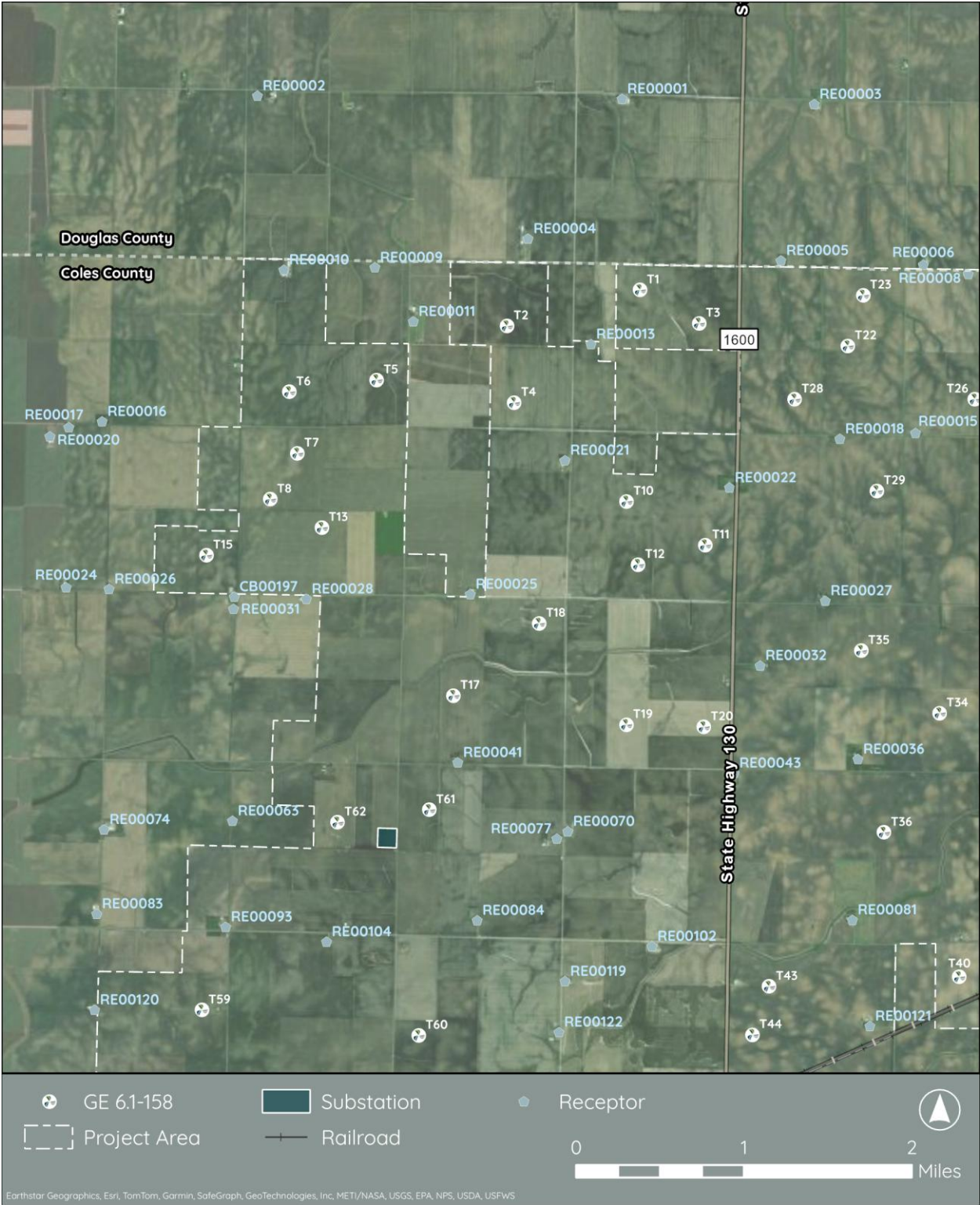


Figure 21: Receptor Map, Northwest Quadrant

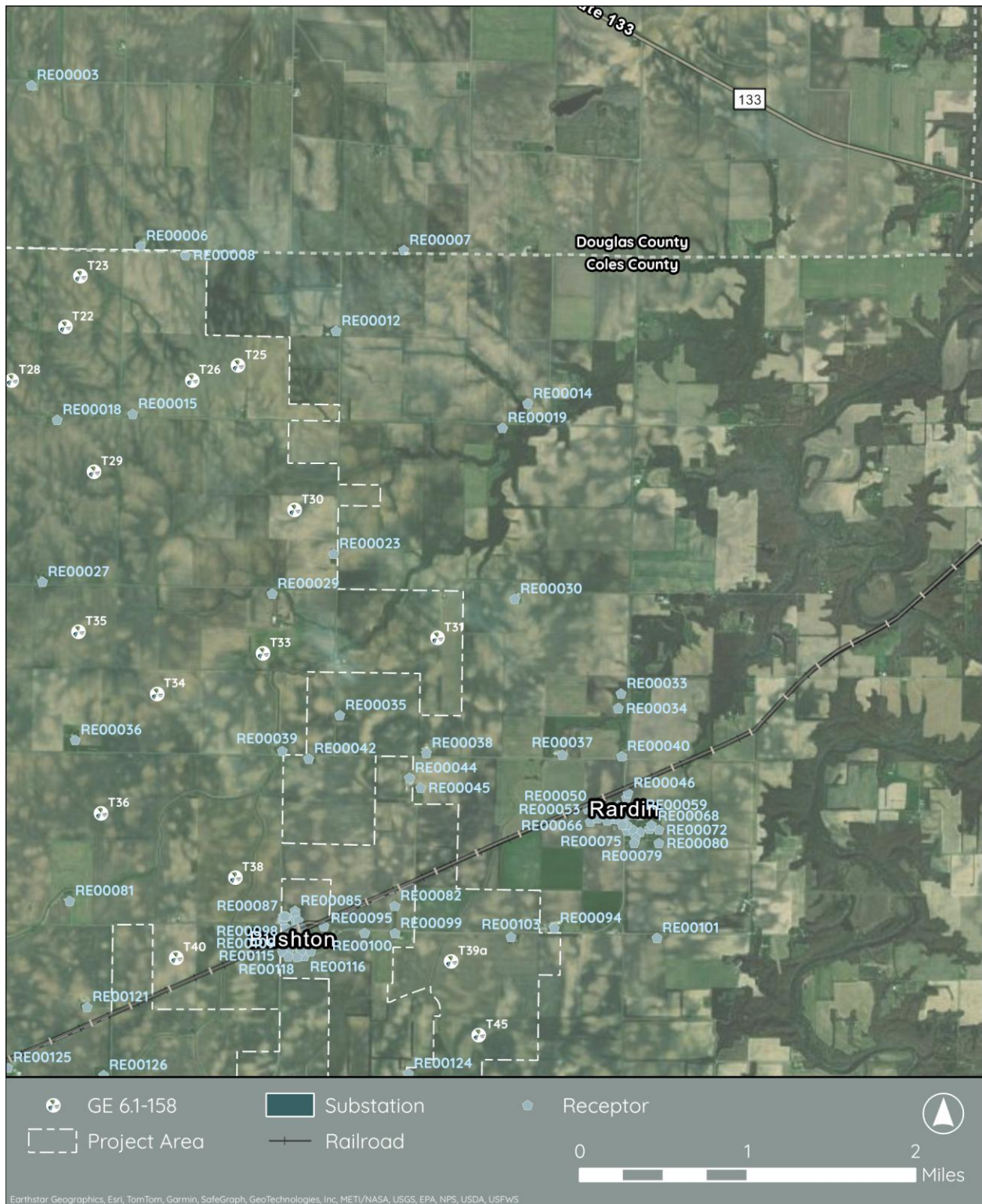


Figure 22: Receptor Map, Northeast Quadrant

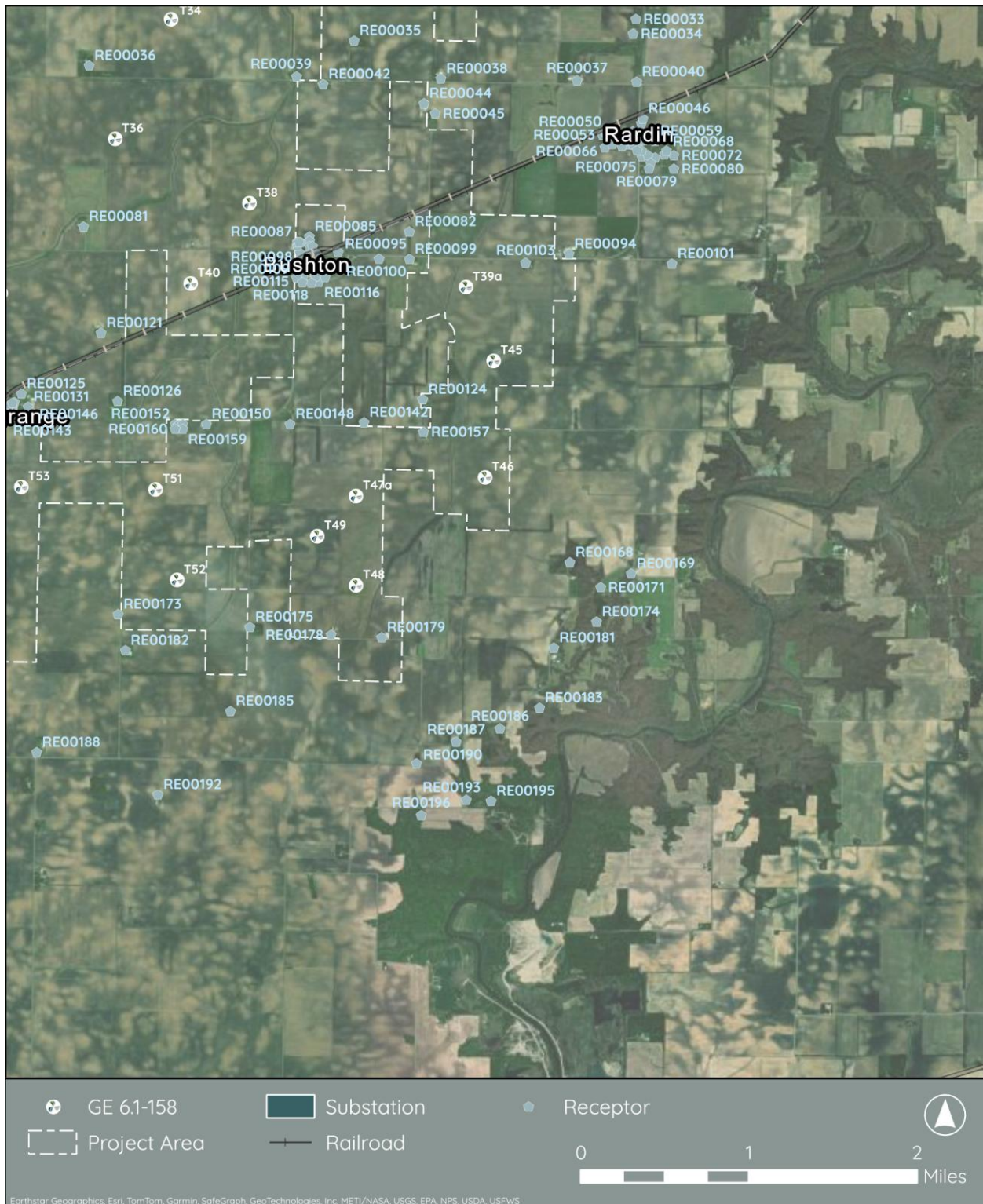


Figure 23: Receptor Map, Southeast Quadrant

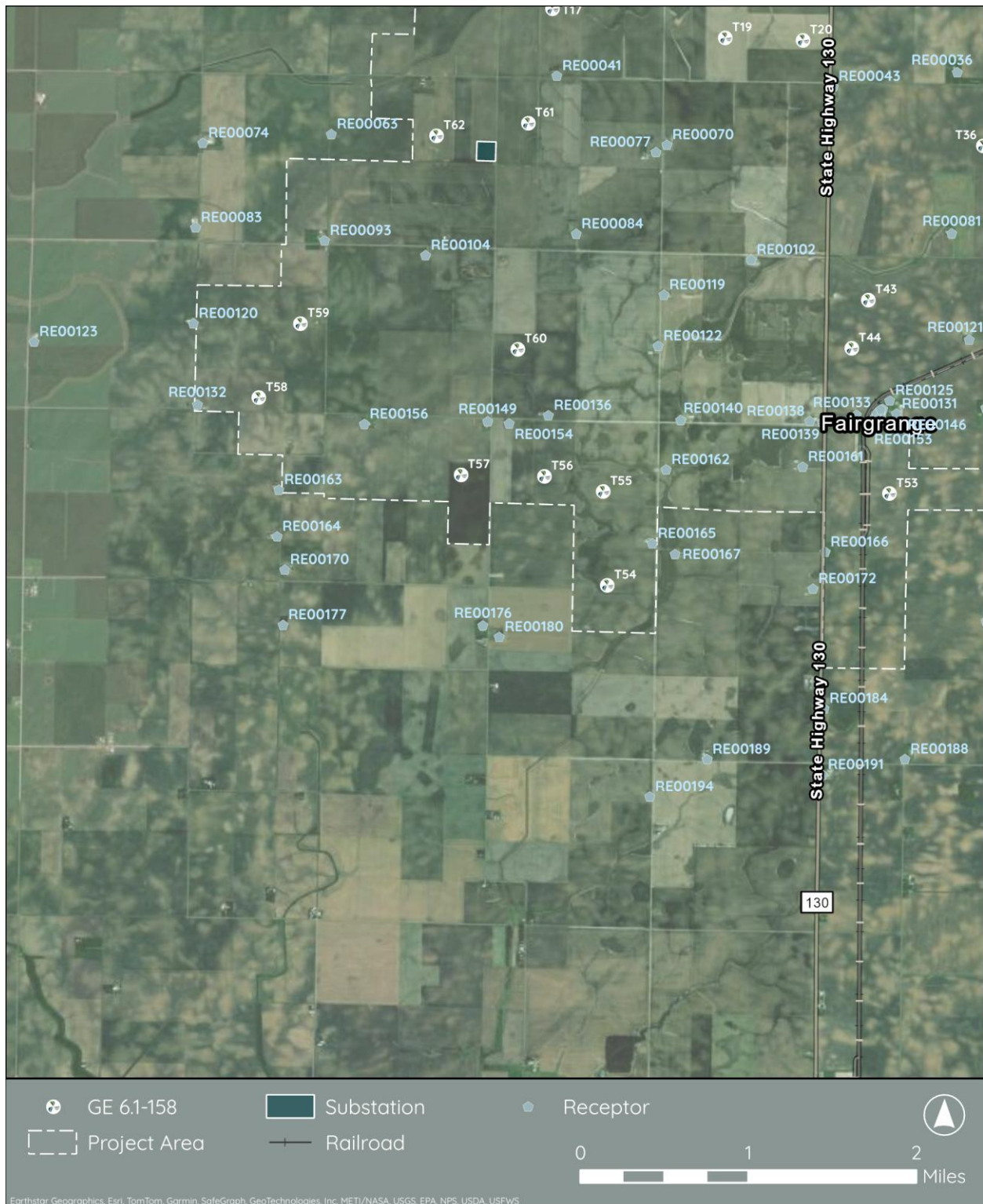


Figure 24: Receptor Map, Southwest Quadrant

## Appendix E: Qualifications

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Paxwood Acoustics provides professional consulting services in acoustics and noise control engineering with a focus on environmental permitting and compliance. Eddie Duncan, Principal Consultant, is a Board-Certified Noise Control Engineer (#09002) through the Institute of Noise Control Engineering and is a member of the Acoustical Society of America. Mr. Duncan has been practicing acoustic consulting for over 20 years. In that time, he has managed over 400 acoustics projects and has worked on 120+ wind power projects, 85+ solar projects, and 70+ transmission projects. He has also managed noise assessments for a growing portfolio of BESS projects which have often been a component of other renewable energy projects.